

# DATA SPACES\_NOW

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INTERNATIONAL DATA SPACES ASSOCIATION MAGAZINE

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23

## Trust in data spaces



# *From concept to reality*



**T**he awareness of data spaces and their importance has grown significantly. We went from the data spaces concept eight years ago (while the term "data spaces" was still unfamiliar to nearly everyone) to big data spaces deployment. We have proven that the concepts are needed, that they are ready and that they work. Now we need to put them into action and demonstrate that they will enhance our lives, boost our economy, and improve our society.

Data spaces are designed to provide data sovereignty and they will be the level playing field of Europe's data strategy. This represents a significant advantage and revolutionizes the data economy of the future – benefiting society, businesses, and individuals. The challenge at hand is a holistic one – from technical complexities, via legal uncertainties to undiscovered business benefits. In order to make that desirable paradigm shift happen, Europe needs to give guidance, support and best practices to its companies, its institutions and all those willing to make that bright future happen. A common data spaces framework will set the fundamental guardrails to realize data sovereignty so that market-ready, usable solutions can appear and flourish as catalyst for innovation based on data.

This paradigm shift is more than a decade endeavor that has already started years ago. Europe can already rely on thorough and comprehensive groundwork – and is close to

# Making data spaces finally a perceptible and indispensable element of our (bright) future

the breakthrough turning the data space paradigm into perceptible reality. The Data Spaces Support Centre leverages all this groundwork and pools the experts and organizations that have brought data spaces this far. Conducting a paradigm shift calls for a long breath – and it needs to follow a constant direction re-using the consensus-driven, proven and field-tested groundwork that has already been provided.

The desired innovation happens in ecosystems and this co-creation relies on trust among the involved parties – the existing ecosystems around the Data Spaces Support Centre should be the nucleus to nurture the erection of countless data spaces and data innovation all over Europe. The Data Spaces Business Alliance plays a central role in this effort, we are collaborating and leading with partner organizations BDVA, FIWARE and Gaia-X, representing a collective of over 1000 companies and organizations at the forefront of data innovation. Additional versatility is gained through our partnerships with MyDataGlobal, iShare, and Data Society Alliance.

With our acknowledged position in international data space ecosystems IDSA is on its way to a global standard – bringing the concept of IDSA into reality. And the global collaboration with Japan, the US, and China shows that this is not only a European endeavor. It has become a movement with many actors around the world.

The IDS reference work describes a common framework which all adhering parties to a data space can trust to handle

their data. It's open, decentralized, agile, and secure, the ideal solution to the burgeoning data economy. But how exactly is this level of trust earned and maintained? Well – we have woven a comprehensive, absolutely trustworthy and technologically state-of-the-art fabric as thorough reference for cross-sectoral, global data sharing ecosystems that we call data spaces. It is the interplay of the core pillars of IDSA "reference architecture", "certification scheme", "data space rulebook" and "deployment scenarios". And we will bring this to global standardization in 2023 while continuously showcasing inspirational solutions and proving business relevance.

The core task for 2023 is adopting, bringing data spaces on the road, making data spaces happen – I can hear myself saying this again and again. But we are working on something big, a true paradigm shift. As I mentioned above: Data spaces are a decade adventure and we need a long breath. Let us continue and enjoy crafting the future. We can tell our children.

Sincerely,  
**Lars Nagel**  
CEO, IDSA

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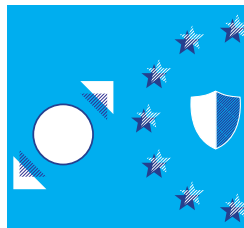
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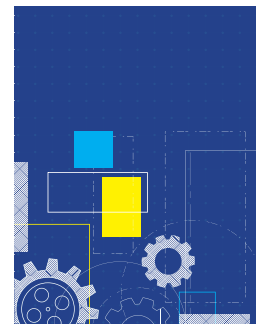
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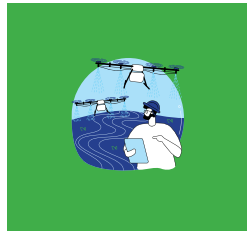
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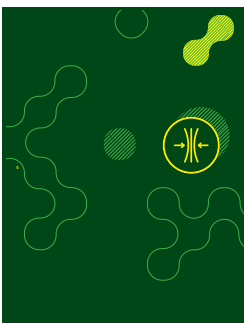
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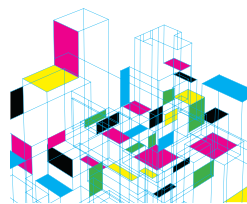
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# Meet our members

*International Data Spaces could never happen without the cooperation of all members. Our members are IDSA: They lead our steering committee, working groups, and task forces, and they head our communities and adoption initiatives. They play key roles in the organization itself.*

*These members are renowned research institutions and associations, medium-sized companies, and large enterprises. **Here we introduce two out of a total of 140.***



## **Qbeast – smart organizing of data in data lakes**

Qbeast Analytics is a data accelerator from Barcelona that integrates with modern big data infrastructures on the cloud. Their mission is to accelerate the transition to a big data-driven economy and society – very similar to IDSA's. To help with this, they developed a technology that stores and organizes data more intelligently and effectively. And to analyze that data, only a fraction of it needs to be accessed to get the required results. They organize data in what they call "cubes".

Each cube's elements are written in a single parquet file, allowing the query engine to filter out some of them before reading their content. The process of analyzing really big amounts of data becomes much faster and cheaper. Insights how to create data products are more easily obtained and machine learning models are trained faster at scale.

Not only that, their technology for organizing data can also be used to share data. The amount of data that actually needs to be shared with other entities is significantly reduced. A big advantage. The biggest impact could be that more companies gain access to data.

So far, it is primarily the largest players in the digital economy who have access to most of the data. They are the ones who really benefit. This could be a game changer, as companies can benefit not only from the data they collect, but also from third-party data and share it with each other in a secure way. Their dream scenario next to optimizing how data is organized is to enable more efficient data sharing. It looks like their technology can help do just that.



### **Easy access to sovereign data sharing with soivity**

In collaboration with IDSA, the company soivity now offers to make data sharing easier and faster: By maintaining IDS-based Connectors, soivity supports data sharing participants with the technical infrastructure. Companies can easily use the connector without worrying about technical challenges, maintenance or compatibility.

There are multiple scenarios to share data with a connector. For example, a marketplace can offer information with conditions set by the data owner, potentially available to everyone. In a B2B setting, sharing parties can securely and sovereignly share sensitive information to improve existing or new business relationships, made possible with connector technology.

In both cases, the core challenge was the technical preparation required by participating companies to share data, as the data connector had to be built according to the specific requirements of each organization. Soivity offers a service that makes data sharing easily accessible.

This service makes it simple to deploy a data connector and operate data spaces, from single-use policies to policy templates, contract details, and license agreements. The connector protects the data and ensures the usage conditions defined by the data owner are enforced. Within the framework of IDS, trust between different participants in a data space can be organized.

The Connector-as-a-Service solution turns companies into data sharing frontrunners, bringing them into data ecosystems where the future of data is happening.

*IDSA expands reach to  
Japan, uniting for  
data sovereignty*







**K**onichiwa Japan, the land of the rising sun. A few weeks ago, Christoph Mertens and I took a 13-hour non-stop flight to Tokyo to learn about the current development of data spaces in Japan and to foster IDSA's foray into Asia. And perhaps, to also get a glimpse of the amazingly organized cosmopolitan city with its influential culture of design, food, and karaoke bars.

The country has a long tradition of a strong interplay between spirituality and innovation. So, to get off to a good start, Christoph and I visited the famous Buddhist Sensō-ji temple on our first day. Besides seeking blessings, we acquired "Omamoris" at the temple - small talismans meant to protect our health and happiness. Omamoris come in small embroidered bags that contain a short prayer. Now, the ground is prepared.

#### Exploring Japan's data spaces activities

Japan is one of the most intriguing destinations for data spaces activities outside of Europe, providing a wealth of support for such initiatives. The Japanese company NTT, an IDSA member, provides essential services for data spaces in the country. We discussed our future collaboration, and the company generously connected us with many companies and institutions in Japan.

At IDSA, we are eager to add Japan to our network of international hub facilitators, a topic we discussed with all partners. There is a strong wish for a hub facilitator in Japan that can support the national data spaces activities. Therefore, our visit to the University of Tokyo had a special relevance, since we are looking for a neutral partner to take over this role. Fingers crossed.

#### Big companies want data sovereignty

With our partner Data Society Alliance (DSA), we discussed the importance of standards and the necessity of interoperable data spaces on a global scale. The DATA-EX platform from Japan is an intriguing counterpart to European initiatives, as it is currently under development.

This business trip to Tokyo also led us to the offices of the big companies Fujitsu and Hitachi, both members of IDSA. With Fujitsu, we discussed their current involvement in sustainable manufacturing and opportunities to link existing data platforms via data connectors to data spaces. Hitachi's interest in usage control highlights the importance of data sovereignty, which is the most crucial aspect of data spaces for data providers, especially given their existing technical foundation.

#### Vital players in a growing network

A few more visits can only be briefly mentioned here: With NEC, we evaluated potential touchpoints for future collaboration joining our community of data space enthusiasts. NEC would be a vital player in our growing network of international corporations. We spoke with Toyota about the importance of data connectors. Topics included the conception of a cross-platform approach via interfaces. At Keio University, we discussed trust levels and the geopolitical scope of data spaces. Another exciting exchange of ideas. And we met with the Digital Architecture Design Center (DADC), the Japanese Automobile Manufacturers Association (JAMA), as well as with the Robot Revolution & Industrial IoT Initiative (RRI).

#### Omamori talisman to be burned in a temple

Overall, there was a lot of interest in the concept of data sovereignty and in developing solutions to connect existing data spaces, as well as eagerness to work together. We are thrilled to continue and expand our business partnerships, and we were promised a return visit soon. A warm welcome!

And since the Omamori talismans Christoph and I bought need to be burned in a Japanese temple after one year - maybe we will visit Tokyo again soon.



**Julien Adelberger**

Senior Project Coordinator at IDSA

## New projects

The International Data Spaces Association receives funding from the European Commission (EC) from the Horizon Europe and Digital Europe program. In both programs there are three different types of actions: Research and Innovation Actions (RIA), Innovation Actions (IA), Coordination and Support Actions (CSA).

### **Research and Innovation Action (RIA)**

Research and Innovation Action is a collaborative project funded by the EU Horizon Europe program that generates new knowledge, explores technology feasibility, and advances the state of the art, with a focus on medium technology readiness level (TRL) activities for fundamental research and technology work

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### **AgriDataSpace – smart farm and agri-environmental big data space [RIA]**

Agriculture faces major challenges: it must meet the world's food needs, provide farmers with an adequate income and, at the same time, protect the environment. To achieve these goals, careful use of resources and smart agriculture are required. AgriDataSpace aims to establish itself as a pioneer of smart agriculture and agri-environmental monitoring.

The project will strengthen smart agriculture capacity, competitiveness, and fair income through the multi-technological implementation of an innovative, intelligent, and fully distributed platform. AgriDataSpace takes a multi-dimensional approach that combines Big Data and IDS-based data spaces technologies with agricultural knowledge, new business models, and agri-environmental measures.

### **DaCapo – digital assets and tools for circular value chains and manufacturing products [RIA]**

DaCapo seeks to establish a methodical approach for creating digital tools and services that prioritize human needs and promote circular economy strategies throughout the entire product lifecycle. This includes design and engineering, manufacturing, use, and end-of-life phases, with a focus on developing new digital assets, AI-based systems, and process and product digital twins. The primary goals are to improve sustainability, efficiency, and the use of imported and critical raw materials (CRM) in manufacturing, leading to greater digital-enabled industrial sustainability and resilience.

To achieve these goals, the project will develop a new methodological approach that considers business models, material flows, and circular strategies throughout the manufacturing value chains. This approach will be supported by a range of digital tools, including digital product Passports and a circular economy decision support system, which will enable the exchange of assets, the selection of optimal circular stock management strategies, and informed and coordinated products lifecycle management decisions in a safe, reliable, and agile manner.

**DIVINE – demonstrating value of agri data sharing for boosting data economy in agriculture [RIA]**

Although some players in agriculture are making good use of the data they generate, the industry still lacks holistic approaches to data sharing and analysis along the agri-food supply chain. The DIVINE project will build an agricultural data ecosystem that incorporates existing agricultural data spaces while conducting industry-led pilots based on data sharing agreements.

The goal of DIVINE is to demonstrate the cost-benefit and added value of agricultural data sharing. It will promote its ecosystem and assessments to technology providers, policy makers, agriculture representatives, and other agricultural data stakeholders – the first concrete steps towards mature data markets in European and global agriculture.

**TANGO – digital technologies acting as a gatekeeper to information and data flows [RIA]**

TANGO sets out to establish strong cross-sector data sharing. The overall outcome of the project is a novel platform that allows user-friendly, secure, compliant, fair, transparent, accountable, and environmentally sustainable data management. The platform will promote trustworthy digital interactions across society, having at its core technology components for distributed, privacy preserving and environmentally sustainable data collection, processing, analysis and sharing.

TANGO uses the power of digital technologies to strengthen the privacy for citizens and private/public organizations, reduce costs and improve productivity. It will unlock the innovation potential of digital technologies for decentralized, privacy-preserving applications, while making accessible and demonstrating this potential.



***Innovation Action (IA)***

Innovation Action is an EU Horizon Europe funding instrument for collaborative projects that develop new technologies, products, processes, or services near the market. It supports high TRL activities for applied research and product work, addressing societal challenges, promoting economic growth, and enhancing Europe's competitiveness.



**DataBri-X – data process & technological bricks for expanding digital value creation in European data spaces [IA]**

In order to fully realize the potential of sovereign data sharing in Europe, the development of data spaces, platforms, and marketplaces is crucial. However, currently, data sharing and interoperability are still in the early stages. The DataBri-X project seeks to address this by providing European data spaces, platforms, and marketplaces, along with their diverse range of stakeholders, with a comprehensive and adaptable data governance process, as well as an integrated, standards-based toolbox for data and metadata management.

The aim is for this toolbox to enhance the interoperability, usability, discoverability, quality, and integrity of data and metadata, making them suitable for digital value creation in the context of European data spaces.



**DATAMITE – data monetization, interoperability, trading & exchange [IA]**

DATAMITE will provide a modular framework for European companies to facilitate data monetization, interoperability, trading, and exchange. To this end, the project will provide users with tools and open-source training materials to improve data management and compliance with the FAIR principles.

The goal is to open up new revenue streams and business models through sovereign data sharing. DATAMITE will validate the results in three different use cases, demonstrating that the framework is interoperable and applicable in different domains and user needs: 1) intra-enterprise, cross-sector data sharing; 2) data trading between data spaces; 3) integration with other initiatives such as data markets, EU AI on demand platform or Digital Innovation Hubs.



**ENERSHARE – European common energy data space framework enabling data sharing-driven across- and beyond-energy services [IA]**

The ongoing digitization of the energy system is making an enormous amount of data available, but data sharing is lagging behind in the energy sector, mainly due to lack of trust, the risk of data breaches and immature business models. ENERSHARE will deliver a reference architecture for a European energy data space, which combining SGAM with IDSA and Gaia-X architectures.

The project will develop building blocks for interoperability, trust, data value and governance that are IDS-compliant and adapt them to the energy sector. It will contribute to data space standardization and consumer-centric business models for energy data sharing. Thus, it will help prepare the ground for the European energy data space aligning with other initiatives.

### **FAME – federated decentralized trusted data marketplace for embedded finance [IA]**

FAME will develop, deploy, and launch a federated data marketplace for embedded finance. Embedded finance is designed to streamline financial processes for consumers, making it easy to access services when they need them. The project will extend a data marketplace infrastructure in three directions: 1) secure, interoperable, and compliant data sharing across multiple federated cloud-based data providers in line with new European initiatives such as IDSA and Gaia-X, 2) decentralized trading of data assets using blockchain tokenization techniques, 3) integration of trusted and energy-efficient analytics.

FAME will be connected to more than 12 data marketplaces operated by project partners, as well as other data infrastructures. Through this process, the FAME marketplace catalog will be populated with more than 1000 data assets.



### **RE4DY – European Data as a product value ecosystems for resilient factory 4.0 product and production continuity and sustainability [IA]**

Data-driven digital manufacturing must incorporate resilience strategies at the production and supply chain levels for their sovereignty and competitiveness. Long-term resilience requires ensuring distributed, data-intensive and dynamic decision support and automation processes that integrate AI into a symbiosis of humans and automation.

RE4DY aims to demonstrate that European industry can build data-driven digital networks to gain advantage through sovereign data sharing across all stages of the product and process lifecycle. The project proposes the core concept of "data as a product". This concept leverages digital ecosystems that support the development and implementation of digital continuity so that distributed data management solutions can be reused instantly and seamlessly.



### **Omega-X – orchestrating an interoperable sovereign federated multi-vector energy data space built on open standards and ready for Gaia-X [IA]**

Omega-X will orchestrate an interoperable, sovereign, federated multi-vector energy data space built on open standards. The aim of this research and innovation action is to implement an Energy data space based on common European standards, including a federated infrastructure, a data marketplace, and a service marketplace. It involves data sharing between different stakeholders and demonstrates the value for concrete Energy use cases, while guaranteeing scalability and interoperability with other data space initiatives, not just for energy but also cross-sector.

The concept and architecture draw heavily on the approaches of IDSA and GAIA-X as references for data spaces – to ensure the highest standards of protection, transparency, openness and trust and avoid vendor lock-in.



### **Zero-SWARM – zero-enabling smart networked control framework for agile cyberphysical production systems of systems [IA]**

Minimizing waste and pollution in manufacturing enables economic progress and conserves resources. The new research project Zero-SWARM strives to achieve climate-neutral and digitized manufacturing through the adoption of 5G technologies in the European manufacturing sector. IDSA will contribute its expertise on sovereign data sharing in manufacturing.

The goal of the project is to develop a multidisciplinary, human-centric approach that will lead to technical solutions for an open swarm framework, a non-public 5G network and a digital twin. Zero-SWARM will be a forum where maturing technologies, such as 5G and cloud edge continuum, data technologies and analytics and operational technologies are co-developed and co-created in ten different trials.

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### ***Coordination and Support Action (CSA)***

Coordination and Support Action is an EU Horizon 2020 funding mechanism supporting research and innovation coordination and networking in Europe, providing services such as training and communication. Unlike other mechanisms, it facilitates research by sharing best practices, promoting knowledge exchange, collaboration, and innovation project development in Europe.



### **DATES – European data space for tourism [CSA]**

DATES brings together key actors of the tourism and data ecosystems and their network of public, business, and research partners to realize a European tourism data space. It will develop a contribution to the digital transformation of the services sector to strengthen European competitiveness. The project will provide a basis for governance and policymaking to foster innovation by tourism data. This could make Europe the most desirable sustainable place to live.

DATES will recommend digital business models. Key success factors will be identified. In addition to providing a comprehensive inventory of existing platforms sharing data, blueprints for addressing technical and organizational challenges will be provided. DATES will be a kick-start for a European tourism data space involving all players on the supply and demand side.



### **DSSC – Data Spaces Support Centre [CSA]**

The Data Spaces Support Centre, funded by the Digital Europe Program, aims to aid public sector organizations and businesses in the creation of sovereign data spaces. As a central component of the harmonization and rollout of data spaces in Europe, the DSSC acts as an "umbrella CSA" to which other CSAs are subordinate.

By exploring the needs of data space initiatives, defining common requirements, and establishing best practices, the DSSC will accelerate the formation of data spaces as a critical aspect of digital transformation in all areas. By providing access to technologies, processes, legal frameworks, standards, and tools, the DSSC aims to enable the deployment of data spaces, foster adoption of technologies and standards, and facilitate the sharing of data to benefit citizens and businesses alike.

### **EU DATA SP4CE – a European common digital manufacturing infrastructure and data space pathway for connected factories 4.0 data value chain governance [CSA]**

The development for manufacturing data spaces in Europe has been conducted by many projects and alliances in the context of national Industry 4.0 initiatives. But also within disconnected startup projects to establish the first "embryonic data spaces" for various applications in different manufacturing sectors. Thus, data space development should not only break data silos per se, but also the silos of data space development.

The main task of EU DATA SP4CE is to foster an alliance that gives a unified voice to data-driven national and EU manufacturing initiatives under one common governance framework for technical and business alignment to capitalize on recently introduced data regulations. This will unlock business models and enrich data value chains in products, factories and supply chains.



PrepDSpace4Mobility

### **PrepDSpace4Mobility – preparatory data space for mobility [CSA]**

The project PrepDSpace4Mobility aims at contributing to the development of the European mobility data space by supporting the creation of an infrastructure that will facilitate easy, cross-border access to key data for passengers and freight. Given the enormous potential of data and digital technologies, the project is expected to have a positive impact on European competitiveness, society and the environment.



# Trust in data spaces





### IDS Certification: digital platinum

Imagine you are an electric vehicle manufacturer, pioneering a novel system for cooling the batteries in your cars. These components are riddled with sensors, gathering countless data points per second. These sensors yield a highly valuable data set, which you want to license to a competitor, who is designing a similar system for their EVs. How can you do this, while maintaining control over the data and how it's used?

This is not simply a question of granting access. You need a network whose connections you can trust to respect the sensitivity of your data and unlock its value. IDS Certification is the crucial tool to building such networks of trust.

### IDS Certification: it's all about trust

Until recently companies that want to share their data had few alternatives to contributing their data to a data pool run by an external provider. However it's virtually impossible to find such a pool that satisfies everyone's needs. What is worse is that, after access to the data has been granted, the data can be altered, copied, and disseminated by the recipient. The data provider can no longer trace who is working with their data and how.

This is a serious compromise. If there is the slightest chance of your proprietary cooling-pump designs ending up in the wrong hands, the return on investment on data sharing becomes much less attractive. This is why many companies view the notion of data-sharing with such skepticism. What is missing is trust: trust in the standards of the network, and trust in all the components in between.

### Empowering sovereign data sharing: data spaces based on the IDS-RAM

This is where data spaces come in. Data spaces provide a distributed digital infrastructure for trusted and secure data sharing among multiple participants while ensuring data sovereignty. Data sovereignty means that the data provider has control over how their data is collected, processed, and used by data consumers.

In today's digital economy, where data is increasingly collected, shared, and used across borders and by multiple organizations, data sovereignty is a crucial aspect of data usage. It recognizes that data is a valuable asset belonging to the provider, and they should retain the final say in its sharing and management.

The IDS Reference Architecture Model (IDS-RAM) is the framework that outlines the key components and requirements needed to build a data space. It provides a common language and structure for designing and implementing data spaces, and it helps ensure interoperability and standardization across different data space implementations. The IDS-RAM includes specifications for key components such as data connectors, data models, and security mechanisms, as well as guidelines for data governance.

### The critical role of IDS-certified data connectors for sovereign data sharing

The data connector is the core component of a data space. It plays a crucial role in enabling trusted and secure data sharing between participants, allowing data to flow seamlessly across different systems and devices. The data connector is responsible for establishing secure connections, verifying the identity and authorization of participants, and ensuring data integrity and confidentiality.

In addition, the connector provides an interface for accessing and exchanging data, while ensuring data usage control. This mechanism allows data providers to set rules and policies regarding who can access their data and how it can be used or shared. Data usage control helps protect sensitive data from unauthorized access, use, or disclosure, and to ensure that data is used only for its intended purpose. Effective data usage control is critical for maintaining data sovereignty.

IDS Certification, as defined in the IDS-RAM, makes sure that the connector is built as specified and by doing so, ensures data sovereignty for all participants of a data space. IDS Certification involves a formal evaluation process that includes rigorous testing, documentation, and review of the data connector against functional, interoperability and security criteria. This process can help identify issues before the

data connector is released and ensures that it is interoperable with other IDS components. Finally, it ensures that data connectors are of high quality and meet industry standards.

### Two assessment levels for ensuring technical interoperability

Technical interoperability is crucial for seamless data sharing. To achieve this, all connector implementations must follow specifications and standards instead of relying on individual approaches. Multiple levels of interoperability, including connector interaction, identity & access management and data usage control, and data exchange protocols, must be addressed. IDS Certification is the ideal method to ensure data connector interoperability.

This is already possible through the Assurance Level 1/ Checklist Approach Certification. Connector owners can perform this assessment themselves using a checklist, that is available through the IDS Certification Portal. The IDS Reference Testbed is also necessary for testing the data connector's behavior in a data space setup. It can be downloaded for free from GitHub. This self-assessment examines whether the data connector has the necessary functionalities to be interoperable with other data space components, as well as whether it meets the required functionalities and security criteria for data sharing.

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To ensure objectivity in evaluating compliance with interoperability and security standards, IDS Certification should be conducted by an independent third-party IDS Evaluation Facility. This in-depth evaluation process, known as Assurance Level 2/Concept Review Certification, ensures compliance with IDS standards for data connectors – and with industry-specific standards and regulations.

### Compliance with industry standards and regulations

To ensure compliance with industry standards, data connectors are tested against key security criteria derived from widely recognized sources such as IEC 62443, secure development criteria, and IDS-specific criteria. IDS Certification is the only certification program that certifies data connectors according to IEC 62443, providing an added level of assurance. All certification criteria and requirements are defined in the IDS Certification criteria catalogues.

Certified data connectors are a one-of-a-kind piece of software, providing a range of benefits that help to reduce conflicts when sharing data, build credibility among stakeholders, and aid compliance with industry requirements and standards. Moreover, they stimulate the innovation of new software applications, and provides high-quality, reliable, and secure products and services for customers. IDS Certification ultimately contribute to the success of data sharing initiatives.





**Tech2B:**

**“We don’t want a winner-takes-all platform!”**

 **TECH2B**

Imagine you want to help shape the future of data, ease data flows, and increase the secure data-sharing benefits for companies and citizens. You might just be a nice benefactor, but you could also be a candidate for the IDS certification, a true pioneer!

From a pool of numerous applicants, five companies have been chosen as potential recipients of the IDS Certification Award. If they successfully complete the data connector certification, they will receive 20,000 Euros in support. The certification process is carried out by independent third-party IDS evaluation facilities, which conduct comprehensive reviews and testing. Obtaining the IDS certificate indicates compliance with all IDS certification requirements and confirms the dedication to offering the utmost level of trust to data-sharing partners.

#### **Marketplace for Manufacturing SMEs**

Let’s start with Tech2B, one of the frontrunners on the journey to IDS Certification. The Dutch company saw an opportunity to digitally support SMEs and started a marketplace to connect suppliers and buyers in the manufacturing industry in 2019. We spoke to one of the founders, Sjors Hooijen, about their business model and why they applied to get certified.

On Tech2B’s digital platform, companies can place, compare, and process orders. Buyers and suppliers can find each other here easily, work out an initial quote fast – and gain new business possibilities. Before launching their platform, they interviewed nearly 40 companies to understand the market needs. All businesses had digitalization problems: no standards, not having the right tools, often not even having any tools. So, after developing a platform, Tech2B started in

2020 as a service provider for SMEs mainly located in the Netherlands. Now, two years later, more than 4,000 companies are active on the platform from all over Europe.

#### **The power of matchmaking**

“We are not standing between buyers and suppliers.” They can do business on the platform without further involvement of Sjors and his team – finding each other through search functions and a standardized way of communicating and transactions. The power of this marketplace relies also on AI-supported matchmaking of supply and demand. With the help of the Smart Connected Supplier Network (SCSN) in the Netherlands, users activate the connector and start working. “This is the reason we implemented the IDS Connector,” explains Sjors. And the connector needs to be able to make all transactions possible for SMEs.

In the future, Tech2B wants to increase the reach of the platform and grow its capacity and functions. “The big challenge for us is to meet supply and demand in the right ratio.” Their ambition is to make not only the order transactions possible, but to have complete product passport functionalities that can connect certificates from the origin of the product – with the help of IDSA.

#### **Being one of the first to get certified**

Tech2B’s vision is to make sure data sharing and data spaces are not only available for the bigger companies but also for SMEs – right from the start. “That is why we want to be one of the first with a certified data connector!”



**VTT: "We really know  
this technology!"**

**VTT**

VTT is a state-owned, non-profit company in Finland whose goal is to provide technical research and innovation services for domestic and international customers. Senior scientist Ilkka Niskanen explained to us why VTT is eager to get certified.

## 20 **Two added features for their connector**

The connector solution they apply to get certified for is based on the Dataspace Connector, an IDS connector reference implementation, but has two additional features. The first concerns the machine-to-machine communication protocol (OPCUA) widely used in various industries to integrate hardware and connect different systems. Companies often need to share this protocol with partner companies and are looking for a secure way of doing so. VTT added the ability to support this OPCUA standard to their connector. An example is Konecranes, a Finnish manufacturing company that supplies cranes to various factories. At times, they may need to share their OPCUA machine data across company borders, and that is when they can use the extension of the connector to do so securely.

The second feature VTT added allows the management of user access. For some organizations, it is not enough to regulate access to data for entire companies or departments, but they want to restrict access to data resources on an individual level. The data provider should be able to define the individuals who are allowed to log in and access the data. Both extensions to the connector are based on VTT's experiences cooperating with companies.

## **Finnish Data Spaces Innovation Lab**

VTT also provides the Data Spaces Innovation Lab, a place, and a service for Finnish companies to try and test technology. They can utilize the lab to build their own data connector solutions. Or they can test their existing solution, including performing compatibility tests. In general, VTT wants to improve its position as an IDS expert organization in Finland.

For Niskanen, it is very important to be able to say, "We were one of the first to get the certification! Our connector is one you can trust!" Sometimes companies come to VTT and inquire if their connector really complies with the IDS reference architecture: "Can we be sure that you guys know what you are doing?" The external review of their connector is critical. "We should highlight it when we communicate with our collaboration partners." And since VTT is also the IDSA hub facilitator in Finland, Niskanen emphasizes, "we should be able to say that we really know this technology." There are IDSA hubs in various countries that share basic knowledge of the ideas and concepts of IDS in their countries.

## **Certification as a problem solver**

Data spaces are one of the key enablers of a fair data economy. Certification is an important step towards creating this kind of trusted data space. "They help us to solve some of the biggest challenges we collectively face – such as sustainability." For now, VTT is fine-tuning a few things, then the official application process can begin. Niskanen concludes the interview by saying confidently, "I don't foresee any problems."



## TNO: "You can't rely on assumptions!"

**TNO** innovation  
for life

The importance of data spaces and their role in breaking down silos between businesses and research is increasingly recognized in today's data-driven world. Maarten Kollenstart, who is part of the Data Ecosystems department at TNO in the Netherlands, described their involvement in data spaces, their connector, and why IDS is crucial for them.

TNO bridges the gap between academic research and business across a broad spectrum, from healthcare to defense, providing applied research. The connector they seek to certify is designed to help smaller companies that do not yet have the (wo)manpower or extensive knowledge to develop their solutions. TNO's mission is to accelerate the participation of Dutch and other European SMEs in data spaces. Recently, their connector was made available as open source, allowing anyone to use it as a suitable starting point.

### A reliable foundation

"If you want to break down silos, it is essential to establish a system that encourages fair data sharing," says Kollenstart. The four fair principles – findable, accessible, interoperable, reusable – provide a clear incentive for companies to participate and simplify data sharing.

In the beginning, when you create a data space, you often have a small set of participants, and communication is easy. But when you scale up, especially if you want to share data between different data spaces, even different types of data spaces, "you cannot rely on assumptions" about the participants and conditions, emphasizes Kollenstart. You need a more reliable foundation.

### Certification validates what was built

That is why certification is so important; it builds trust. "Someone else than the maker of it has looked at it." On top of that, it validates "what we have built and all the research we did and that it is now suitable for actual use by companies," Kollenstart concludes. The certification label will also help TNO in the future when the connector is used in newly created projects. This certified basic component is a good platform to start with.

The next step is to work with the evaluation facility and set the timeline. Kollenstart is optimistic: "We hope to start the evaluation process soon."





## Engineering: "We need to be pioneers!"



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Engineering Group is a digital transformation company based in Italy and operating in many countries around the world with 12,000 employees. Angelo Marguglio, Head of the Digital Industry R&D unit, took the time to outline their involvement in the digital ecosystem. From his base in Southern Italy's Palermo, he passionately described how they started providing digital solutions for deploying data spaces in the manufacturing industry but are now also moving into other domains.

"We started collaborating with IDSA a long time ago to figure out how to support the digital transformation of the supply networks and extended enterprises, focusing on how to create trust between different players and stakeholders." Angelo has been involved in the IDSA's architecture working group from the beginning.

### Cross-domain technology for European data spaces

Two years ago, Engineering began developing the TRUE Connector to enable an OSS implementation capable of dealing both with data usage control and personal data enforcement compliant with GDPR regulation. The connector is part of the FIWARE catalogue and is fully integrable with the main OSS IDS infrastructural components. Initially, they concentrated on the manufacturing domain but soon saw that the connector technology is domain-independent and worked well in other domains. As a result, the TRUE Connector is now adopted for digitalizing circular and sustainable value chains and has also been experimented with in the energy domain, smart buildings, and the agri-food domains.

This idea of accessibility and interoperability is vital to Engineering. Many companies are eager to get the benefits of data sharing and the data economy. Engineering supports

them in the digital transition needed to take advantage of this technology.

"We realized that it is important to get the certification to make the connector available to our business partners." Shortly after the award was announced, Engineering made the decision to apply. A IDS-certified connector ensures that defined levels of security, including infrastructure reliability and process compliance, have been met and provides guarantees on availability, confidentiality, and integrity of the developed solution.

The TRUE Connector is open-source. Angelo emphasizes, "open-source technology can support each other's business, if we work together with the best technology providers. We need to be pioneers in adopting this technology." The ability to work with an open-source connector makes it significantly easier for companies to join the ecosystem.

Currently, there are no significant technical barriers to limit the adoption of data spaces technology in small and large businesses. But what is the real challenge in Angelo's eyes is the access to the value of data sharing. "In many initiatives we talk about vertical, domain-specific data spaces, which are for sure valuable, but we see that cross-domain value is even more attractive for our partners."

In the coming months, Angelo and his team plan to increase the number of contributors to the TRUE Connector project to effectively adopt and develop it further. This way, the entire community is experimenting with it and can thus provide new insights and requirements for adoption in various domains.



## T-Systems: "We have a lot of experience in handling huge amounts of data!"



T-Systems is the B2B division of the German company Deutsche Telekom, the biggest telecommunication company in Europe and the third biggest worldwide. Their data scientist, Dandan Wang, sat down with us to discuss connector certification, as well as the company's plans for the data economy in the coming years.

"We provide telecommunication and connectivity for companies, which means we have a lot of experience in handling huge amounts of data," says Dandan Wang. Communication, data transfer, and data storage are their expertise, and central to this is a reliable server infrastructure. The company operates 16 data centers globally.

### Reliable core connector for certification

"Some think this is not directly related to data spaces, but it is," Wang stresses. T-Systems manages the IT service in data spaces for small and large companies and research institutions. The connector is at the heart of it. That is the reason they want to get it certified. And "IDSA is the first on the market to provide a clear path to certification." Now they can follow the process, submit the documentation, and start the application.

Certification "is also very good for the value proposition of our product. At the same time, I think that it allows us to further distinguish our connector offering." In the end, T-Systems does not want to be a data space participant like a data provider or data user. T-Systems aims to be a trusted service provider to data space participants and data space operator. Data connectors, among other technical components, are essential to make sure that all services can be used by anybody, anywhere. They see their role as similar to the one in their telephone business: a client who wants to make a phone call does not need any expertise or technical

knowledge, just a phone and the number, and they provide the underlying services.

### Designing a suitable offering

T-Systems launched its first data space product, Data Intelligence Hub, in 2018, the first market-ready product based on IDSA's reference architecture. Since then, other projects have followed (including the lighthouse project Catena-X), and their connectors transferred enormous amounts of data in each of them. Wang knows they are on the right track when another use case participant says: "I don't need to do anything, I just need to tell you where my data is!" Their customer-centric offerings release customers from worrying about how to onboard to the data space. The mission is to provide a data space ecosystem to the customer on their terms, for their needs and constraints in terms of efficiency, scale, and price.

### "We'd like our connector to become a mass product."

All this needs trust. And the starting point is always the data connector. That is why certification is such an important part of the process. T-Systems will submit information to show they did the work and are fully reliable. There are different connector types in the growing market, making the transfer of data between them not necessarily automatic. Interoperability between data sharing ecosystems is still a challenge. For that, T-Systems is working on their managed connector version, which has significant business value, especially since the current and near future market is not yet standardized.

For now, Wang says we need to talk about connectors and certification as much as possible because more and more companies will be interested in joining the data economy and should know about the IDS approach.



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# IDS evaluation facilities: ensuring interoperability and trust

**D**o you have a data connector and want to be part of a data space? Then you need one thing above all – trust! Trust in the functionality and implementation of the data space and in the way the connector is built and works. This is where the Spanish company SQS comes in.

SQS is the first approved IDS evaluation facility, responsible for the independent validation of the IDS components and the operational environment of data spaces. This means the test facility makes sure that all the elements are interoperable and secure. A good reason to ask Begoña Laibarra, director of SQS, a few questions:

## **Why should a company have its components and operational environment certified?**

As a participant in a data space, you want to use certified components in a certified operational environment to be sure your data is shared securely. IDS Certification ensures that components provide this security. If your company develops and commercializes IDS components, for example, the market requires certification. And once a component is certified, it can be used in various data spaces!

Organizations that offer services such as connector-as-a-service or data-space-as-a-service must have their operational environment certified. This is also a clear requirement of the



market if you want to participate and do business around data spaces.

#### **What criteria are tested for the connector certification?**

The certification criteria for a connector include security aspects, functionality, and interoperability within an IDS architecture. We also test the installation and operational guidelines, review completeness and accuracy of the documentation, such as the test plan and the design documentation. Additionally, we assess some key activities of the development process configuration. So, not only the product itself is reviewed but also the supporting documentation and key practices of the development life cycle.

#### **Are there different connectors for different scenarios?**

Yes, data connectors share data in scenarios with different trust and security requirements. For example, sharing medical data needs more security than sharing climate data. The criteria correspond to three trust levels. Depending on the trust level, different levels of security must be met by the connector.

This means connectors on the market will have various security profiles. Let me explain: Connectors with a Trust 1 profile are suitable for sharing data with limited trust and security needs, for sharing data in a contained environment, or for demonstration purposes. Trust 2 profiles are designed for scenarios where the protection of processed and transmitted data is essential. Trust 3 profiles include the protection against insider attacks as well as external attackers who could gain privileged access. You can find the certification criteria for each trust level in the criteria catalog.

#### **What does the evaluation process look like?**

This process varies depending on the “assurance level”. If the applicant seeks an Assurance Level 1, no evaluation facility is involved. It is the applicant’s responsibility to perform a self-assessment and send the results to the certification body at IDSA.

To do so, the applicant must download and use two assets developed by IDSA: a questionnaire and the IDS Reference Testbed, that includes an automated test suite. The applicant must submit the completed questionnaire and the results of the execution of the test suite. For Assurance Level 2, the evaluation process is carried out by the evaluation facility.

#### **How are the components tested by SQS?**

We use the IDS Reference Testbed as the standardized test environment and perform the test according to the reference test plan – to cover all criteria. We also perform documenta-

tion and design reviews, vulnerability analysis, and penetration testing. The extent of the evaluation depends, as I said before, on the level of trust required. After the contract is signed, we explain the process to the applicant in detail and share the evaluation plan. Errors we might find during the evaluation, we will report immediately so that they can be corrected before the process is completed. At the end, we produce an evaluation report summarizing all the evaluation activities and results.

#### **How can companies prepare for certification?**

We recommend carefully reviewing the catalog criteria and performing a self-assessment, documenting how each component implements each criterion. This will allow the company to decide which trust level to apply for. To assess whether the implementation complies with the criteria, you use the testbed and the test suite. We advise you to develop your own additional tests later. A good idea might be to participate in the Plugfests organized by Fraunhofer-Institute for Software and Systems Engineering ISST and in the ITS, short for Integration Test Camp, managed by SQS – both provide additional support. They help detect errors and clarify issues during the development. IDSA offers instruments and tools to support developers throughout.

#### **What is the Integration Test Camp?**

The ITC is a service offered by us for IDS component developers. Currently, it is free for IDSA members. We have implemented a complete IDS infrastructure to test the interoperability of IDS components in a production-like scenario. The ITC service offers remote access to this infrastructure along with a set of interoperability tests and full support from an SQS test engineer throughout the process. The service has proven to be a very useful instrument to detect defects during the design and development of a component. We had more than 70 participations with components at different stages of development.

#### **What is the value of an independent third-party evaluation?**

We, as an independent evaluator, follow the principles of independence, impartiality, and integrity. There is no conflict of interest for us, and conclusions are not influenced by any stakeholder. These third-party evaluations are performed by specialized and accredited evaluation facilities; we must follow a uniform process, and the results have to meet the highest quality standards and be comparable with each other. An independent review of a product can reveal weaknesses and problems that are not always easy to identify by the development team itself. Basically, we help companies using control to build trust.

# Let's talk about IDSA's task force legal

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**D**espite the complexity of legislation and regulatory aspects concerning data spaces, they play a crucial role in ensuring innovation while safeguarding privacy and security. IDSA's legal advisor and moderator of the task force, Dr. Söntje Julia Hilberg, explains what it does.

Legal topics are increasingly important in the context of data spaces. The new EU regulation is becoming an essential part of building and maintaining data spaces. "Even though IDSA's focus is on technology and governance, not on solving legal issues for data spaces, regulation is on everyone's mind," Dr. Hilberg explains, and must be discussed and aligned with other initiatives. "The alignment is very important, as most legislation by its very nature needs to be translated into practical approaches and solutions," and a common understanding of legal terms is necessary to create a trustworthy data sharing landscape – in the EU and beyond.

For this reason, IDSA has re-established its task force legal to discuss regulatory developments and specific legal topics, and to organize the collaboration and contribution of IDSA members. It will strengthen IDSA's internal and external positioning on legal issues.

#### **What are the responsibilities of the task force?**

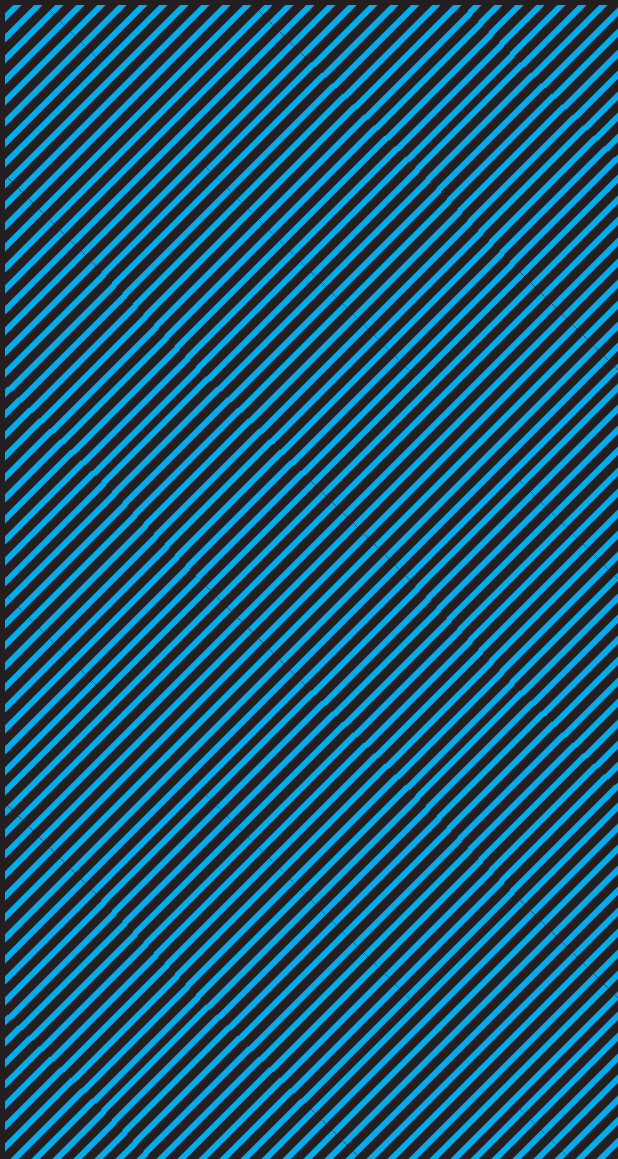
There are two areas in which the task force legal will be active:

Public Voice. The TF works and communicates externally to give impulses or input to the outside world. For example, when the European Commission proposes regulations, IDSA discusses them as a stakeholder in this group. This is



important to incorporate our experience, expertise, and assessment into the development of the regulation and to help the Commission create a regulation that works in real-life cases. Additionally, IDSA can proactively give impulses on legal issues to the outside world that are considered significant and develop a position on them.

Tasks and solutions. The internal workstream of the TF serves as support for the working groups and for projects. There are requests from IDSA working groups, as happened recently when the task force contributed a chapter to the new version of the IDSA Rulebook. Or questions come from projects: How can I deal with the contractual issues? In the tasks and solutions section, we try to find answers and provide input on concrete questions within our community. However, it is important to note that while the task force aims to provide guidance and input, it cannot provide legal consultation, and any information provided should not be considered legal advice.



#### What are the structure and the tools of the task force?

The task force legal formed a structure of small units. "A survey was made to find out what is most important. Everyone could indicate their fields of interest," Dr. Hilberg says. Based on that, a map of the legal issues is created, and the subgroups for those topics begin to meet. "There might be only six to eight people in each group at the beginning, with an elected chair in each. But we assume a more effective outcome by breaking down the complexity of topics into focused subgroups."

The entire task force legal meets every quarter. These meetings consist of two blocks, which are on the agenda each time:

First, a topic impulse, in which one of the members reports on a topic of interest. Dr. Hilberg remarks: "For example, we recently had a member talking about the topic of data sharing with China." Seeing that China has a completely different regulatory framework when it comes to data. How can you deal with that? What are the possible risks? "This is a current topic, which is not only relevant for IDSA. Forming an opinion on this topic is for sure relevant."

After the topic impulse, the second block consists of a report from each subgroup, discussing their activities. Which issues are you concerned with? Dr. Hilberg emphasizes, "We want to be very specific and concrete." Subgroups can be on ethics, legal interoperability, and data agreements, among other topics. There is an overlap with all IDSA working groups. Legal issues, for example, can impact the architecture of data spaces. In addition to the subgroups and meetings, workshops are held every three months - open to all.

# New EU regulatory environment for data spaces

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By Dr. Söntje Julia Hilberg

The EU Commission published the “European Strategy for Data” in 2020 to create a single market for data that ensures Europe's global competitiveness and data sovereignty. As part of this strategy, the Commission proposed different regulations (see the box on page x for details):

- **AI Act Proposal (AIA-E)**
- **Data Act Proposal (DA-E)**
- **Data Governance Act (DGA)**
- **Digital Markets Act (DMA)**
- **Digital Services Act (DSA)**

The complexity of the regulatory framework is increasing, but the regulations are not yet aligned, and the interplay with existing legislation such as data protection laws, competition laws, or regulations on intellectual property is not clear. Also, the terminology is not aligned, which causes difficulties in their interpretation and interoperability with existing legislation.

The new regulations differ regarding their subject matter and scope. While the DMA and the DSA are instruments to

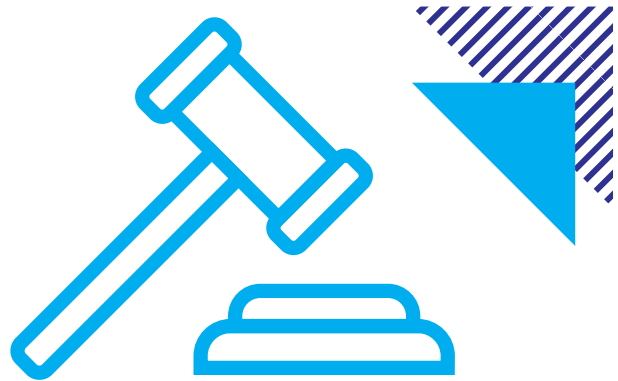
regulate competition and rights in the digital market, the DA-E and the DGA mainly concern access and use of data. The AI Act can be seen as a separate proposal with little connection to the others. With respect to B2B data spaces, the more general DA-E and DGA will have the greatest impact, while the other regulations are less central in this scope.

### Considerations regarding DA-E and DGA

The DA-E concerns the rights to access and use data generated by Internet of Things (IoT) devices. Therefore, it applies to roles related to such data, including manufacturers, data holders, data recipients, and providers of data processing services. As the DA-E covers the whole lifecycle of data processing, it may impact use cases in the data space as the data needs to be handled in compliance (e.g., the grant of access rights).

Due to its broad definitions, the DA-E leaves considerable room for interpretation, creating legal uncertainty. Another uncertainty concerns the interfering with existing contracts and the DA-E impact on the contractual freedom. The freedom to negotiate should be restricted as little as possible to encourage the building of value chains and innovation. Imbalances could instead be addressed through EU competition law or sector-specific legislation. It remains to be seen to what extent the DA-E will undergo adjustments to create legal certainty and practical solutions for data sharing.

The DGA comes also with some concerns, especially regarding the broad definitions for the roles in data sharing (e.g., data holder, data user). Also, how it addresses services provider



intermediation service providers, that play a key role in the data economy:

- Obligation for data sharing service providers to notify competent authority.
- Conditions for providing data sharing services, such as neutrality, fair, transparent, and non-discriminatory access to services, adequate technical, legal, and organizational measures to prevent transfer or access to non-personal data that is unlawful under Union law.

The European Commission decided to adopt this approach to ensure that data governance within the Union is based on trustworthy sharing of data. A key element in increasing trust and control of data holders, data subjects, and data users is

***"Interoperability specifications for the functioning of common European data spaces, such as architectural models and technical standards implementing legal rules and arrangements between parties that foster data sharing, such as regarding rights to access and technical translation of consent or permission."***

roles does not cover the complexity of data spaces. The envisioned data governance and the respective roles do not achieve the intended goals of facilitating data sharing. Given the complex roles and services within data spaces, the DGA term "data intermediation services" needs to be aligned with practice as data spaces use different terms for data sharing services.

The DGA defines a number of obligations (such as notification and compliance requirements), especially regarding

the neutrality of data intermediation service providers concerning the data shared. It is necessary for these providers to act only as intermediaries and not use the data shared for any other purpose.

The approach and key elements of IDS concepts reflect the DGA's goal of trustworthy data sharing, which involves neutral intermediaries and reliance on reference architecture, connector technology, and certifications.

### Challenges and opportunities for EU's DIB in developing common data spaces

The DGA approach comes with several challenges. It only frames general rules, while the details are subject to national laws and need to be translated into practical solutions. The European Data Innovation Board (EDIB), proposed by the DGA, will play a fundamental role. It will support the EU Commission in issuing guidelines to facilitate the development of common European data spaces, as well as identifying standards and interoperability requirements for cross-sector data sharing.

There might be a link between the DGA and other regulations on the topic of interoperability standards. For example,



the DA-E defines that the guidelines for "interoperability specifications for the functioning of common European data spaces, such as architectural models and technical standards implementing legal rules and arrangements between parties that foster data sharing, such as regarding rights to access and technical translation of consent or permission" should come from the EU Commission. Therefore, it is likely that such guidelines will come from the EDIB under the DGA. It will be beneficial to link these tasks to achieve harmonized rules in practice between both regulations.

This task will directly relate to the activities of data space initiatives such as IDSA, which will play a major role, as they have already developed frameworks and reference architectures that can act as blueprints for common standards. The EU strategy should build upon existing data sharing initiatives in the quest for interoperability and the specification of future soft infrastructure agreements (see L. Nagel and D. Lycklama in *Designing Data Spaces - The Ecosystem Approach to Competitive Advantage*, p. 19; <https://link.springer.com/content/pdf/10.1007/978-3-030-93975-5.pdf>.)

For the future development of data spaces in light of the new EU regulations, the Data Spaces Support Centre ([www.dssc.eu](http://www.dssc.eu)) will also play a significant role in providing aligned support for common EU data spaces.

**AI Act Proposal (AIA-E):** Proposed April 2021, legislative procedure ongoing. EU framework for regulating AI; applies to providers and users of AI.

**Data Act Proposal (DA-E):** Proposed February 2022, legislative procedure ongoing. Obligations of developers + manufacturers of products to facilitate the user's access to data generated during the use. Facilitating switching of data processing services, introducing safeguards, and interoperability standards.

**Data Governance Act (DGA):** Applicable September 24, 2023. Reuse of data by public sector bodies; framework for data intermediation services + voluntary registration of entities that pro-

cess data made available for altruistic purposes; European Data Innovation Board.

**Digital Markets Act (DMA):** Will enter into force on May 2, 2023. Regulating internet corporations/gatekeepers (e.g., social media platforms, search engines). Prohibits practices that make it difficult for users to use non-gatekeeper providers.

**Digital Services Act (DSA):** Will enter into force on February 16, 2024 (some provisions apply earlier). Protection against illegal content + for users' rights. Applies to intermediary services (e.g., internet access providers, cloud services). Regulations on liability, handling of illegal content, provision of a notice-and-takedown procedure, and regulation of online platforms.

# IDS standardization: a turning point



As data continues to transform industries and economies worldwide, International Data Spaces (IDS) have emerged as a crucial component of secure and efficient data sharing. Sebastian Steinbuss, IDSA's CTO, and Silvia Castellvi, Senior Consultant for Stakeholder Engagement, sat down to discuss the crucial role of standardization for IDSA.

What is the challenge here? With IDS maturing at a rapid pace, it's essential to ratify the current de facto standard supported by IDSA at an international level. This article sheds light on the significance of standardization in IDS and how it can booster trust among stakeholders and industry players looking to leverage the power of shared data.

#### Standardization is a must

Simply put, we are at an inflection point in the evolution and adoption of IDS. At this scale, standardization is no longer an option, it's a must. The other inte-

invest in data spaces to the next level. What's more, it will democratize data spaces by making them truly accessible. As Sebastian Steinbuss explained:

"In Europe, we have legislation such as the Data Governance Act (DGA). Organizations need to be able to show that they are compliant to the Act. Now, they can spend valuable resources on writing reports explaining that they are behaving as they should. But compliance becomes much easier to demonstrate if there is some kind of measure. This is what European standards provide."

From this we can deduce that the barriers to standardization have to be accessible, yet rigorous. It's a fine balance, but one which the internationally recognized standards we are all familiar with achieve. The process is straightforward: An organization adopts a standard; they then provide evidence of how they are implementing the leg-

and what we need to investigate. We predict a time frame of one to two years for this. We will then define and ratify a standard with the scope of the ISO. This may take a further year."

At the European level, progress is already well underway. An IDSA activity-asset – the Data Space Radar – maps what's happening in the field and the DGA in relation to European Standardization. Another workshop is in progress at the level of the IEEE. This covers the Data Trading System (i.e., data trading within data spaces). The challenge is to align the scopes of these different endeavours. Silvia, IDSA's standardization project manager, outlined the complexity of the task:

"You can think of us as aggregation-experts. We are collecting use cases and reference implementations of data space across different domains and sectors. We're then structuring this data as documentation which our

***"We'll begin a project to delve into what's already known, what we can further specify, and what we need to investigate. We predict a time frame of one to two years for this. We will then define and ratify a standard with the scope of the ISO. This may take a further year."***

national standards that we are familiar with, for example IEEE, ISO, and W3C, are fundamental to enabling us to work together. Whether it's USB-C, HTML, Wi-Fi, electrical plug sockets – these standards are at the core of international interoperability and trade. They are what ensure best practice and collaboration. It's no different with the communication between data connectors.

While the evolution of data spaces thus far constitutes a major achievement, standardization is what will take the trust which organizations feel able to

isolation in their organization; they then undergo external evaluation.

#### Roadmap to standardization

While the specific bodies that will provide IDS standards have not yet been decided, the road map to standardization is rapidly taking shape. The first step is to understand where in data spaces is a need for internationally recognized standardization. This will take around six months. "Following this," Sebastian explained, "we'll begin a project to delve into what's already known, what we can further specify,

working groups can use as input for standardization. While we have a lot of content from our technical documentation, such as the communication guide, papers on semantic interoperability, the reference architecture, and so on, these only provide guidelines for implementing data spaces. They don't constitute a standard. These can only be created by standardization bodies."

It's a feat of collaboration, involving experts working within the standardization bodies, more than 30 research projects within IDSA, as well as the in-



dustrial enterprises building data spaces along with their content, requirements, and the technologies that they are using. IDSA's role is to gather

North and South America, African, Australia, and Asia, each of whose national committees will have their own definitions and requirements re-

***“This is our chance for European standards to be driven by European companies.”***

all this data and communicate it via key documents, such as the IDS Reference Architecture Model, which are then handed over to the experts in the standardization bodies who then determine what's needed to make standardization possible.

As we move closer to the goal, laying the foundation of the European data economy along the way, it's becoming more and more vital to impress on all stakeholders the importance of standardization. International Data Spaces is currently a European idea; international standardization will incorporate

guarding standardization. As progress quickens, the time these partners to get on board is now.

**A clear ROI**

The benefits of standardization hardly need repeating. That said, it's worth emphasizing that when standards are defined, the go-to-market becomes extremely fast, since organizations will know exactly what to adopt and implement in order to participate in a data space.

In such a rapidly evolving technological context, time becomes a key constraint. In this climate, it can be tempting to compromise on security and trust, or worse, to altogether reject opportunities for data sharing and collaboration. The call to action on standardization is therefore clear.

IDSA is already carving out this space by leveraging the results of the projects. But the drive isn't coming just from IDSA. In addition to the standardization bodies that have already recognized the need for standardization – a major achievement in its own right – the European Commission has also backed the need for action in this space.

International associations like IDSA can drive standardization activities with support from the research projects funded by the European Commission. The innovations delivered by the projects and the broad support from the involved organizations are an effort from the European Commission to make sure that standardization



happens. Sebastian pointed out:

*“This is our chance for European standards to be driven by European companies.”*

IDSA will serve as a hub for stakeholders who are interested in the standardization of their data space connectors and want to stay updated on the latest developments in the field. Through this hub, stakeholders can learn how to contribute to the standardization process and initiate the adoption and implementation of IDS. The time to get involved is now. This is the tipping point when International Data Spaces evolve from a de facto standard to one recognized world-wide as ensuring trust, sovereignty, and interoperability in data-sharing.



# EDC & IDSA: Let's build our data-driven future together!

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**D**ata spaces are built through partnerships, between the IDSA and everyone who wants to use, benefit from, and help shape the data ecosystem.

The Dataspace protocol forms the technological basis for standardized communication in data spaces to establish trust for data sharing based on data connectors. Through this foundation of a standardized protocol, the IDS Reference Architecture Model (IDS-RAM) acts as a blueprint for building data spaces. It contains a comprehensive set of concepts and standards for data sharing while maintaining data sovereignty.

This includes APIs (Application Programming Interfaces) for data sharing, a structure for semantic interoperability, and a certification scheme. As part of the certification process, independent evaluators verify the components' compliance with the specifications of the IDS protocol and the rules and agreements of the IDS-RAM.

Protocol development, IDS-RAM, and the certification scheme are managed and maintained by IDSA and its mem-

bers, allowing everyone to develop IDS components and build millions of data spaces. To promote and accelerate this effort, IDSA recently introduced a broad open-source landscape.

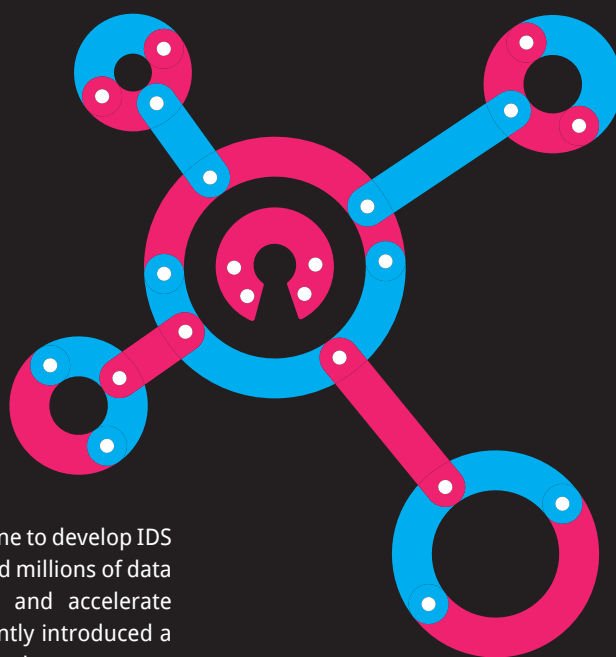
## Open-source components for IDS-compliant data spaces

The Eclipse Dataspace Components (EDC) project is an open-source project under the governance of the Eclipse Foundation. It provides a comprehensive set of components to implement data spaces in full compliance with IDSA requirements on Dataspace protocol, rules and agreements of the RAM, and compliance with the IDSA certification scheme.

The Dataspace protocol guarantees technical interoperability with all other connector projects that follow the Dataspace protocol. All components

that are part of EDC are designed to enable the development of data spaces that comply with the RAM.

The EDC is part of the IDS open-source graduation scheme and is supported by the Fraunhofer-Institute for Software and Systems Engineering ISST, Mercedes-Benz Tech Innovation, BMW Group, Deutsche Telekom, Amadeus, Microsoft, Google, AWS, SAP, ZF Friedrichshafen, and many others. The Eclipse Dataspace Components project enables the use of the Gaia-X Trust Framework to base data spaces in the Gaia-X Trust Anchor.



### Eclipse Dataspace Components capabilities

The EDC is a set of components to build data spaces. Its main component, the Eclipse Dataspace Connector, is designed for sovereign, inter-organizational data exchange based on IDS. The connector framework contains modules for performing data query, data exchange, policy enforcement, monitoring, and auditing.

The Eclipse Dataspace Components are an extensible, portable, platform-independent multi-cloud framework. This framework supports not only the IDS standard but also relevant protocols associated with the Gaia-X project to create a system for trusted data sharing where each organization autonomously decides who to share their data with. Furthermore, any data space participant leveraging the Eclipse Dataspace Connector can define the exact conditions under which data is shared and exert control over how shared data is being used by the recipient.

Through its decentralized design and support for many popular data transfer protocols, the Eclipse Dataspace Connector provides enterprise-ready

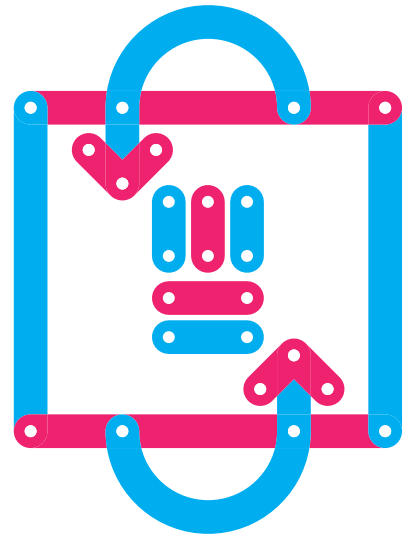
scalability and performance, even for the largest and most demanding organizations.

### Interplay for innovation

Many of the participants in the EDC project are members of IDSA and part of the working groups that shape the IDS standard and concepts together with the developers and maintainers of other data connectors and data space components. That means that learnings from the open-source developers will be immediately incorporated in IDSA, and knowledge and experience are shared among the partners in the IDSA ecosystem. As a result, an improved protocol and RAM will enhance the data connectors. Making it a perfect example of seamless and efficient knowledge transfer in a dynamic innovation cycle.

If you are interested in being involved in the decision-making process and shaping the DS-RAM, please become a member of IDSA and join the Architecture Working Group.

Feel free to use the IDS concepts and the EDC – nobody needs to start from scratch. You are welcome to use what is already there and working; be part



of the OSS (Open-Source Software) landscape and actively drive the development forward.

Let's build our data-driven future together now!

**Authors: Markus Spiekermann & Sebastian Steinbuss**

**Markus Spiekermann** is Head of Department Data Business at Fraunhofer-Institute for Software and Systems Engineering (ISST) and Project Lead for Eclipse Dataspace Connector.

**Sebastian Steinbuss** is Lead Architect and CTO at IDSA.

### All together for data sovereignty

All stakeholders across the industry, academia and government are encouraged to join and contribute to this open and IPR-free project. The EDC project is governed by the Eclipse Foundation and the source depot of the Eclipse Dataspace Components can be found here.



Eclipse Dataspace  
Components on GitHub



Contribute to the Eclipse  
Dataspace Connector on GitHub

# Revolutionizing education

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# IDS testbed trains next-gen engineers

**T**hey are critical in the development of IDS software components and provide a controlled environment for evaluating functionality and performance: IDS testbeds. One of these testbeds is located at the VTT Technical Research Center in Finland, where it is frequently used by students at Oulu University – the first university in the world to teach students how to develop IDS components for data spaces.

The testbed is a part of the research and technology company VTT's Data Space Innovation Lab. Its function is to test data sharing technology to ensure it is working correctly. The university course uses the lab to train its software engineers.

We spoke with two people responsible for the pioneering collaboration: Minna Isomursu, professor for digital health and data-driven services at the University of Oulu, and Tuomo Tuikka, lead for data space solutions at VTT. Why are data ecosystems and data management so important for future software engineers?

## A new mindset for the data economy

"We in Europe are creating and investing in technical infrastructures to be adopted by industry, so people who will work there should have the skills to use them," explains Minna Isomursu. It is essential to train students so that they develop a mindset of how to work in these emerging environments. Tuomo Tuikka says, "We are laying the foundation for new ways to share data

and new kinds of services and the data economy altogether."

The topics of data sharing in data spaces and entire data ecosystems are new to the software engineering curriculum. The University of Oulu is now establishing collaborative relationships with many universities in Europe – under the Digital Europe and other frameworks – to scale up.

The focus of the course is not on teaching specific technical implementations and solutions, as technology is constantly developing and changing. The technical elements organizations use today might not exist anymore by the time the students graduate. Therefore, they are taught ways of thinking and an understanding on the conceptual level.

## Getting your hands dirty!

"It's also about being very concrete. To have your hands in the dirt, so to speak," Tuikka states. The practical experimentation in the test environment gives the students the opportunity to play around with the components in the testbed and to run interoperability tests. Truly sharing data and seeing how it works makes learning more contextualized and impactful for the students, encouraging learning by doing. It is also mutually beneficial, as the students learn about testbeds, data spaces, and ecosystems, giving VTT feedback on how these testbeds work in practice.

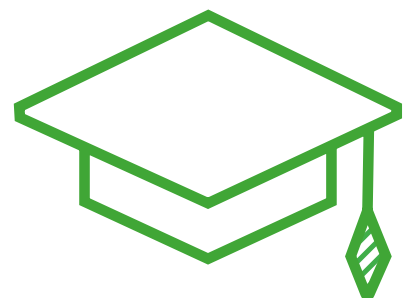
The students are enthusiastic to learn what the possibilities of data sharing

mean for the European economy and what positive societal effects data sharing can have. The generation being educated is already quite experienced in its use of data. They are innovative, creating concepts and ideas based on what they learn at the university. In addition to the degree program, there's a huge need to upskill people who are already in the workforce, an essential aspect for Europe to tackle.

## VTT and IDSA are in it together

IDS is an approach to sovereign data sharing and an excellent example of the European value-based principles for data sharing. It is an example of how the European way of data sharing, which recognizes the rights of all participants and emphasizes security, can be put into practice.

As the Finnish IDSA Hub facilitator, VTT not only offers the testbed to students, but also to the industry and anyone interested in data sharing. As the testbed is a data space implementation, it can be used for various purposes. It conveys to others that this is the way to do it!



# Where data meets society

We met online with Antti 'Jogi' Poikola to discuss the complementary aspects of two key players in data spaces: IDSA, and Sitra, Finland's innovation fund. Jogi is lead data architecture specialist for Sitra. He also sits on the board of MyData Global – an award-winning non-profit which supports individuals' rights over their personal data.



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**Before we dive in, can you give us a little context? Where are you calling from, and why are you so well positioned to give us an insight into the big changes underway in the European Data Economy?**

I'm calling from Helsinki, where I've been working on the fair data economy for basically my entire professional life. I started working for Sitra last year as a lead Data Architecture Specialist. I founded MyData Global in 2018. During that time, I was also working as a researcher for Aalto University. I then joined the digitalization team of Technology Industries of Finland (TIF). I am now in IDSA's rule book working group and following some of the work streams in IDSA too.

**A finger in every pie. How has your perspective on data sharing shifted over this time?**

While working for TIF, I was heavily involved in looking at the legal landscape of the data economy, and in influencing the formation of the Data

Governance Act. In my current job at Sitra, I focus more on the technology – we have to consider the business, legal, and technological implications of the new economy. We must also think hard about the societal impact. The data economy has to amount to a force for good. That's why MyData has such a strong focus on helping people and organizations benefit from their personal data in a human-centric way – to create a fair, sustainable, and prosperous digital society for all. It also ties in nicely with my personal motto: 'where data meets society.'

What it boils down to is data sovereignty. To give you a clear picture of how these organizations interact in Finland to bring this about: Sitra hosts the Finnish GAIA-X hub, VTT hosts the Finnish IDSA hub, and finally MyData Global is based in Finland.

**Can you tell us more about Sitra, and how their activities complement IDSA's actions?**

Sitra approaches data sharing on

three levels. First: what does it mean for individuals? That's personal data. Second: What does it mean for organizations? This is where we're pushing for data spaces. Third: What does it mean for society? This is where we look at the whole data space environment and the regulations shaping the fair data economy.

I discovered a funding call for a Data Spaces Support Centre, which would support the European Data Innovation Board – EDIB –, defined in the Data Governance Act. Realizing that the group getting the DSSC funding has the mandate to support EDIB, I saw an opportunity for Sitra and IDSA to collaborate.

**And the EDIB will enhance the interoperability of data and data intermediaries between different sectors and domains.**

That's right. Specifically, the EDIB will develop consistent practices for authorities to use to confirm whether or not a data intermediary complies with



the requirements set out in the DGA. Intermediaries need to meet these requirements to be acknowledged as a 'provider of data intermediation services recognised in the union.'

**Am I right in thinking you weren't actually working at Sitra at that time.**

Exactly. But I knew Sitra should be part of the proposal as they care deeply about what happens in this area. The key thing is that there is an obvious lineage in the creation of a de facto standard for data sharing according to a European model, which is to say, a decentralized data space economy. Now we have a legal basis from the Data Governance Act for how these de facto guidelines should be set. Both Sitra and IDSA are promoting the rulebook approach in bringing this about. In fact, IDSA's rulebook relies on some of the work done in Sitra, so there's a lot of resonance between the organizations.

**How and why did the rulebook approach take root in Sitra, and in data space organizations in Finland generally?**

That's a fun story actually. It involves saunas, snow, and some wrestling. Back in 2019, when I was working at Technology Industries of Finland and MyData, we, along with some people I knew working on Sitra's IHAN project, organized what you might call a data spaces boot camp. We booked a nice hotel in the forest near Helsinki, where we spent two days thinking about the future of data spaces, data operators, intermediary services... everything related to the area.

One question we wrestled with was how to enable decentralized data sharing among potential competitors.

There's so much risk involved. Well, some of the group had strong backgrounds in finance and banking and were familiar with the idea of decentralized data sharing among competing companies.

**The question being, how do they make it work?**

Right. And the answer is that they use rulebooks – sometimes hundreds of pages thick – which precisely describe the roles, responsibilities, processes, and governance for decentralized networks with many competing parties. Crucially, there are no point-to-point contracts between the different parties. Instead, there is one rulebook that all the parties have signed. In effect, the rulebook is like a constitution for the data sharing networks.

**But can this rulebook apply to every context? Surely there are many nuances to each relationship between data providers, and the intermediaries, too.**

Of course. There are as many rulebooks as there are data sharing networks or data spaces as we call them now. It all depends on who is involved, and under what scope.

**But saunas, snow, wrestling... you can't leave us hanging Jogi...**

Ok, to return to the story, our boot camp shifted its focus to how the methods of data sharing in finance could or should be applied to data sharing in any setting. This immediately resonated with what was a very diverse group... we had lawyers, tech people, bankers as I mentioned. In fact, it was the technology specialists who at that moment said, ok, if we have this constitution, this rulebook, then it needs a technological implementation so that there's no laborious paper-signing. It should all happen cryptographically. The idea and the process began to crystallize.

Which was when we fired up the sauna. And yes, there was some friendly wrestling in the snow, which was apparently instrumental for our discussions ;) The following day, Sitra decided to support the further development of the rulebook idea. A group of legal advisors and technologists produced the first version of a rulebook template for fair data economy in 2019. Version 2.0 was published at the end of August this year.

**Some literal and metaphorical wrestling. Both necessary it seems. If you were to encapsulate the idea of a data spaces rulebook, what would that look like?**

The rulebook is a framework which defines the questions parties need to ask about the data network they are building. Everyone simply completes the rulebook according to the particularities of their jurisdiction, their organization, and the data they wish to share and how. The point is they don't need to reinvent these contracts every time. They can draw on the rulebook's documents to establish and govern a data network based on mutual trust that shares a common mission, vision, and values.

**Has this been put into action yet?**

Yes, in fact Sitra's Fair Data Economy Rulebook was used for the first time back in 2020. Partners in the pilot project were SEB, a leading Nordic financial services group, and Wärtsilä, a leader in smart technologies and complete lifecycle solutions for the marine and energy markets. The partners used the rulebook's checklists to shape their data ecosystem. From clarifying technical procedures to implementing necessary data exchange functions, the rulebook helped the partners concretize their ecosystem.

**This really shows how organizations such as Sitra and IDSA are paving the way for the new European data economy to flourish. Let me ask you a fundamental question: Who, or what, is a data intermediary?**

Ok, well let's take the example of MyData operators. We have about 40 organizations facilitating data transactions between data sources and data-using services. These operators – the intermediaries – don't collect and use the data. Rather, they are the equivalent of phoneline operators, managing the connections between the different parties. It's the same

idea with data spaces, which exist to facilitate the connections between parties.

**When does a data space really need an intermediary? Could parties simply create their own point-to-point contracts on the basis of their own needs? Why the middleman?**

MyData, Sitra, and IDSA have been discussing this question lately. Considering the vast scale of data sharing, the answer becomes clear. With billions of people and countless connections, intermediaries are essential to provide infrastructure for cross-border data exchange. Trusted intermediaries should offer connection tools as a service, rather than requiring individuals to procure data connectors.

And let's face it: enterprises aren't prepared to jump through any hoops to connect to a data space. It has to be effortless. That's why organizations like MyData and IDSA need a common connector-architecture, and solid, well-defined rulebooks and so on. And they have to acknowledge the vital role of the operators – the intermediaries – serving enterprises as they unlock the potential of their data.

**For the sheer variety of users seeking to access data spaces, there need to be intermediaries who serve them. But to do that, they have to share common business models and common requirements. There has to be a framework of mutual trust and regulation supporting them.**

Which is why the Data Governance Act has explicitly recognized and regulates the role of data intermediaries. We don't want it to turn into the wild west after all, which is a risk in an emerging market where there is so much at stake. The Data Innovation Board, supported by the DSSC, will play an important role in interpreting the DGA's legal requirements that

data intermediaries must meet to receive the official title 'provider of data intermediation services recognised in the union.'

**What sort of time scales are we looking at? When can we expect the EDIB and the DSSC begin to come to fruition?**

The DSSC officially began last year. The Digital Europe program, funded by the European Commission, will be set up and operating the DSSC by the end of 2025. The DSSC will then be coordinating all relevant actions on sectoral data spaces in Europe. The EDIB, though legally ratified, will be implemented this year. Our role is to support the EDIB once it exists.

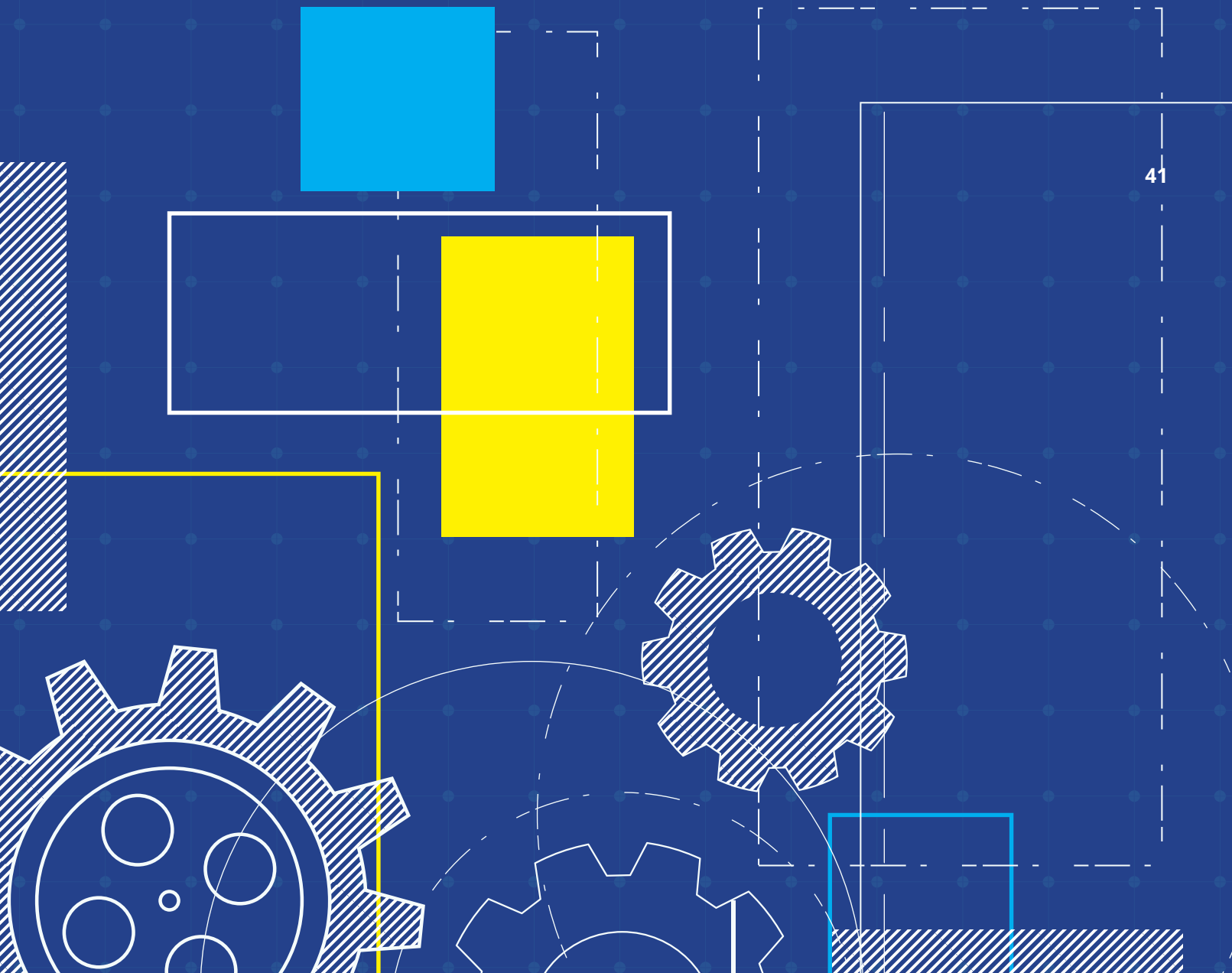
**It sounds like there's no time to lose.**

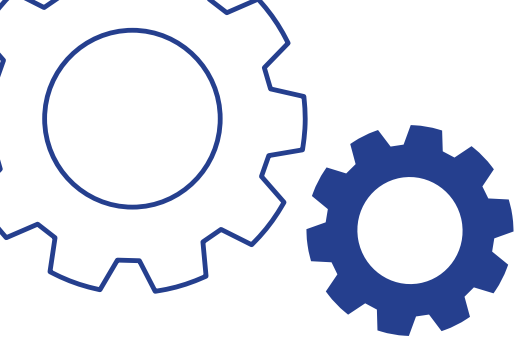
You know, in the last hundred years, we've seen these seismic shifts in areas such as public education, labor rights, and health care. So much can happen in so little time. Right now, we're on the cusp of another such change, except, when it comes to digitalization and data, our societies are likely to be affected more quickly and deeply than anything we've experienced before. Digitization's transformative power will be seen most clearly where data meets society, which is kind of my personal tagline. MyData, the Data Spaces Support Centre, Sitra, IDSA, the data space hubs... they all energize this interaction.

**Where data meets society. That's a beautiful, and exciting note to end on. Jogi, thanks for your time and insight.**



# From OpenDEI to the Data Spaces Support Centre





**T**he coordinating and support action “OpenDEI” (Open Digitizing European Industry) has laid the foundation for pan-European data spaces that are compatible and interoperable from the moment they are implemented. With its roots in the former European strategy to digitize the European industry, the project generated a framework of all the available building blocks needed to accomplish this task. These results – 12 building blocks in the areas “Trust”, “Data Value”, “Interoperability” and “Governance” as fundamental ingredients of universal design principles for data spaces – have been handed over to the Data Spaces Support Center (DSSC) so that

blocks it contains, and the blueprint itself as it emerges from these comprehensive resources.

#### **OpenDEI Task Force 1**

For this, we’re going to listen carefully to two key protagonists in the data space story: Mike de Roode, from TNO, who has been deeply involved in the establishment of the DSSC; and Silvia Castellvi, the representative of IDSA’s OpenDEI Task Force 1 who knows in detail how the key assets developed by the task force – the Design Principles for Data Spaces position paper and the Building Blocks Assessment – provide the guidelines for minimum behavioral framework implementation for data spaces considering OpenDEI building blocks. One of the challenges facing European data spaces is the sheer diversity of the data economy. So far, 15 data

#### **Design Principles for Data Spaces**

The need for transparency and interoperability was a key driver for OpenDEI Task Force 1’s activities. Led by IDSA, the task force leveraged the expertise of data spaces and OPEN DEI ecosystem experts, synergizing their diverse knowledge-sharing backgrounds to co-create a position paper: **Design Principles for Data Spaces**. As Sylvia Castellvi laid out at the OpenDEI final event, the Task Force smashed their KPIs: the paper has been tremendously successful, having been downloaded some 2500 times, and presented at over 400 events in the last year alone.

Chapter two of the paper describes a broad range of general building blocks that enable the technical, business, operational, and organisational capabilities of data spaces. The task force

***“What we need, is one common story so that parties know what a data space is, not only in terms of the technology, but also in terms of governance and legal frameworks. There has to be transparency, which means providing an open-source solution that explains everything you might need for your data space, and which, if you know what you need, will tell you which types of companies you need to approach, and whether there are already open-source building blocks available for your purposes. This is how we will ensure interoperability.”***

**Mike de Roode, Consultant Data Ecosystems at TNO**

the consensus based groundwork can be compiled into what we can think of as a blueprint for data spaces: a toolbox providing all the components needed for cross-domain data spaces to take root in the EU data economy. In this article, we want to look at these assets in greater detail, with a keen eye on the Design Principles for Data Spaces and the catalogue of building

spaces have been investigated, spanning all domains. While each of these domains has its own requirements and approaches to data spaces, it will be counterproductive to attempt to accommodate them all, for example with 15 different kinds of data spaces. Interoperability, after all, is non-negotiable.

achieved this by cataloguing existing building blocks and experience, and by listening to the requirements and feedback from experts and others who have implemented data spaces in their own ways. It was then a question of defining the parameters of the current activities of these data spaces and establishing the common archetypes.

### A blueprint for data spaces

As a high-level map of universal and fundamental ingredients data spaces are composed of, chapter two of the position paper enabled the creation of the task force's second asset: **the Building Blocks Assessment**. This asset goes into detail about the building blocks' definitions and technologies, and how they enable data spaces to exist across domains. Collaborating with domain-specific initiatives and organizations in the health, manufacturing, energy and agricultural domain common denominators have been identified. In sum, the assessment redefines and clarifies the components of the data spaces by focusing separately on each building block, with the aim of introducing the reader to data sharing and its benefits.

Evolving from the OpenDEI project and keeping the core experts the Data Spaces Support Centre has been launched in 2022 – widening the scope to all industries and domains including more societal perspectives. Working closely with the OPEN DEI consortium, the DSSC has embraced and brought together an even bigger European-wide community of associate partners, with the purpose of connecting data-space initiatives to an open structure which allows anyone to boot requirements. In effect, as Mike remarked at the OpenDEI final event, the DSSC will act as a data spaces help desk, while also ensuring the level of interoperability that will make secure, sovereign data sharing across domains so compelling.

Mike painted a clear picture of the deliverables DSSC will offer. One of these is the **data spaces blueprint**. Emerging from the Design Principles for Data Spaces Position Paper and the Building Block Assessment, the blueprint is a comprehensive framework containing but amending and detailing the OpenDEI building blocks, and combining everything you need to set up a data space. As a one-stop-resource-shop, it will also ensure interoperability between various domains, answering such questions as: Which building blocks are required in our case? or how can we certify our data space?

### A heartbeat for the European data economy

The DSSC will release the latest insights into governance frameworks and technologies to the community every six months. In fact, the first of these 'heartbeats' has already

come out: the **'starters-kit'**. This is basically an early version of the data spaces blueprint – a data spaces 101 – which defines data spaces, shows parties where to start and where they can get help, and provides them with a checklist of requirements for their data space – including the types of technical and non-technical building blocks they need – and a catalogue of the considerable resources already available.

On that note, it's important to remember that at the conceptual data spaces level, there are already a lot of resources out there. In the field of data spaces we are confronted with an extremely diverse network of stakeholders, including domain-specific data spaces themselves, of course, but also other initiatives ranging from formal standardization initiatives to the planned Data Innovation Board, which is still in development, and the many European funded and industry driven projects which will be started once they have developed their technical infrastructure. All of these add both complexity and opportunity to the challenge.

### A wealth of knowledge and experience

Thus, at least as far as defining the generic capabilities needed to set up a data space, there is a wealth of knowledge and experience to hand. The intention of the data spaces blueprint, however, is to give orientation, pool any kind of available knowledge and provide actual technical and functional specifications – a Yellow Pages of technical components – specifying, for example, which implementations are open source or commercial, or what compatibility exists to ensure interoperability.

If an entity wants to participate in the burgeoning Europe data economy, they simply can't do it alone. With the assets we've explored today, they now have access to the components and support they need to unlock the value of their data, sharing it across domains with the certifications and standards they need to ensure data sovereignty and interoperability.

This is how, from the Design Principles for Data Spaces, through the Building Blocks Assessment, the Data Spaces Support Center and the Blueprint for Data Spaces, we can trace a clear path to the emergence of European data spaces which both capitalize on the diversity of their participants, and operate securely according to one common story.

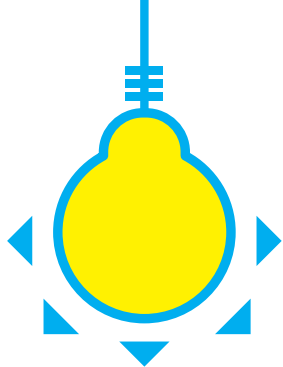
Join the community of data experts and enthusiasts by reaching out to the DSSC – whether you seek support, collaboration or just want to stay informed about the latest developments in the field.

Visit [www.dssc.eu](http://www.dssc.eu) to learn more.

# *Build trustworthy data spaces with the new IDSA Rulebook*

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The much-anticipated version 2.0 of the IDSA Rulebook has finally arrived, offering invaluable guidance to businesses looking to navigate the world of data spaces. But what exactly does it contain, and who will benefit from it? We caught up with Marko Turpeinen, CEO of 1001 Lakes and co-chair of the IDSA Working Group Rulebook, to find out what's new and why it matters.

"We're in a fascinating moment where communities are increasingly establishing data spaces," notes Turpeinen. While the previous version of the rulebook explained IDSA's identity, operations, and global impact, "the new rulebook takes it further."

The IDSA Rulebook is a guide for applying the IDS architecture as a basis for data spaces. It helps data space initiatives define their rules, governance mechanisms, and legal basis. "We are literally taking steps towards the different ecosystems and their communities to support them with this rulebook," Turpeinen says. The goal is to clarify: How do you set up a data space? What is mandatory to include? How can it be made trustworthy? "This new version of the rulebook is much more comprehensive and reaching out to a broader audience."

### Who should read the IDSA Rulebook?

The rulebook is for participants in data ecosystems, data sharing initiatives, people and companies interested in data sharing standards, and those who want to know how to set up data spaces. "Basically, anybody who wants to create a concrete data space, but also those of you who already run a data space or are part of a data space

initiative. You can see whether you are aligned with the requirements IDSA suggests for building the best functioning and secure data spaces," Turpeinen emphasizes.

The rulebook caters to two groups of people: those who are new to data spaces and want to learn how to get started, and those who want to use it as a reference to check if they are following IDSA's advice for data spaces. "You don't have to be a lawyer or a software engineer to benefit from the text. The IDSA Rulebook is accessible to readers with diverse backgrounds and expertise."

### What is the rulebook about?

The rulebook contains all functional requirements as well as technical, operational, and legal agreements to build and operate data spaces based on IDS. The rulebook lists mandatory and optional functionalities that a data space can have. For example, Turpeinen mentions, "proper access management is necessary to fulfil the criteria of being a data space." These listings give structure to the various ways a data space can be implemented.

As stated in the IDS Reference Architecture Model, data spaces must be created according to IDS principles, which means that the rulebook is specific to IDS. But also, when a company joins an existing data space, there are instructions and built-in initiation steps. This document can also help determine how mature an initiative is by checking if it adheres to the IDSA Rulebook's guidelines. It's crucial to ensure that the initiative is trustworthy before joining.

### Input from the community

"We encourage the IDSA community members to examine the rulebook," Turpeinen stresses. "Our call to action is: Give us feedback in the area of your expertise and let us make this rule-

book and its future versions as good as we can together!"

Input is sought for all parts of the rulebook, but the rulebook working group is particularly interested in comments regarding these three topics:

**Inter-data space governance:** It's challenging when several data spaces need to agree on how to share data at the governance level. Should the rulebook provide guidance on this issue, or should it be left out of the document?

**Data space authority:** IDSA has newly introduced the idea of a data space authority, which explains its role and what it does in this rulebook. It's a way to structure the governance side of data spaces, but it's not yet tested enough with community members. Does it make sense?

**Legal templates:** The document includes templates, which are a set of legal agreements that data space initiatives could use as a resource. Do these contractual agreements work in this context? Is there something specific in national regulation that we could add to what we are proposing?

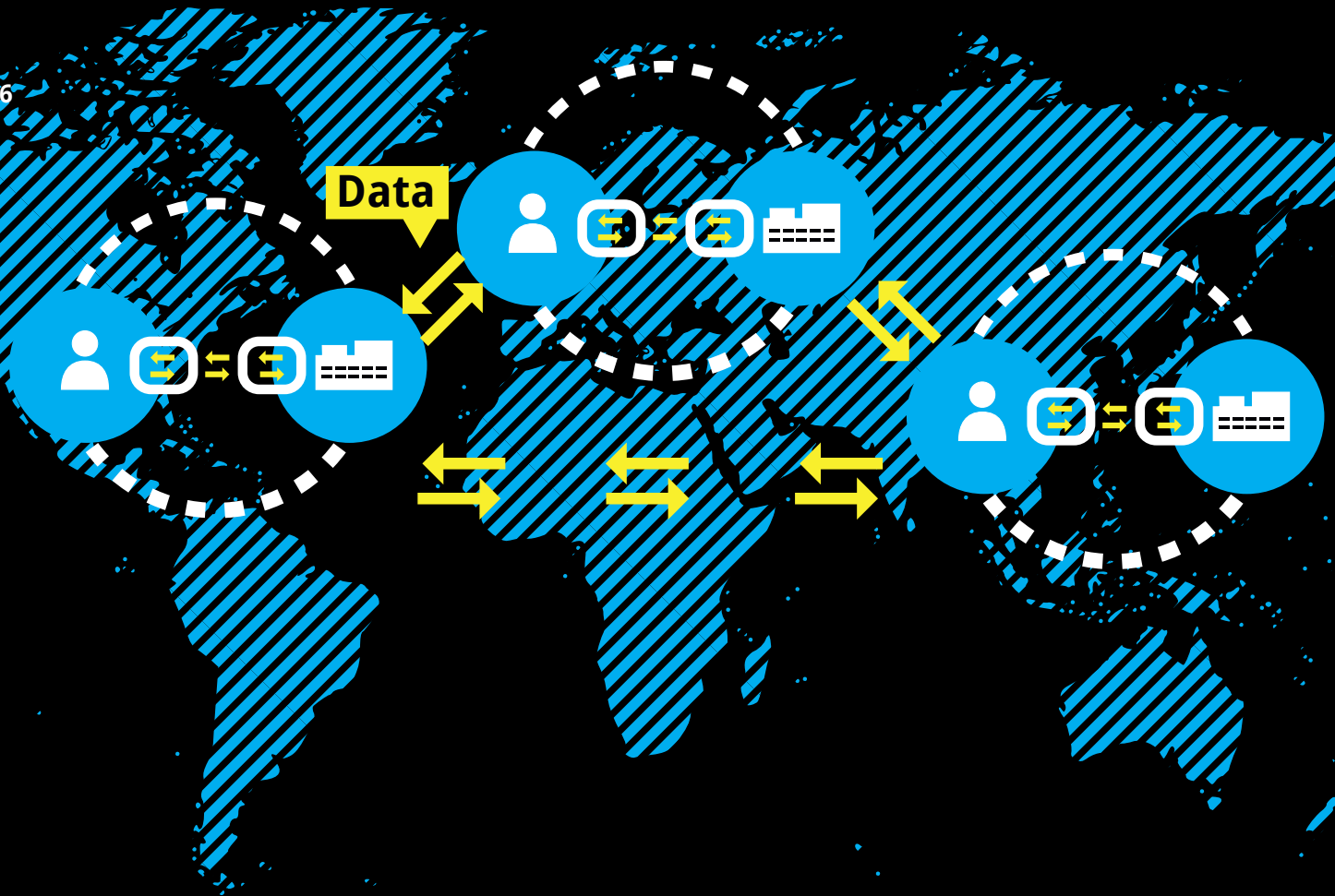
### Main takeaways

The IDSA Rulebook provides guiding principles for building and defining data spaces with specific architectures and rules to maintain data sovereignty while sharing data. It offers solutions to the growing market for data sharing.

The analysis of the functional, operational, and legal framework for data spaces is ongoing and subject to continuous debate and will be continued in future versions of the rulebook. Common governance frameworks for data space instances can achieve interoperability between data spaces.

# Connected data spaces: letting data spaces talk to each other

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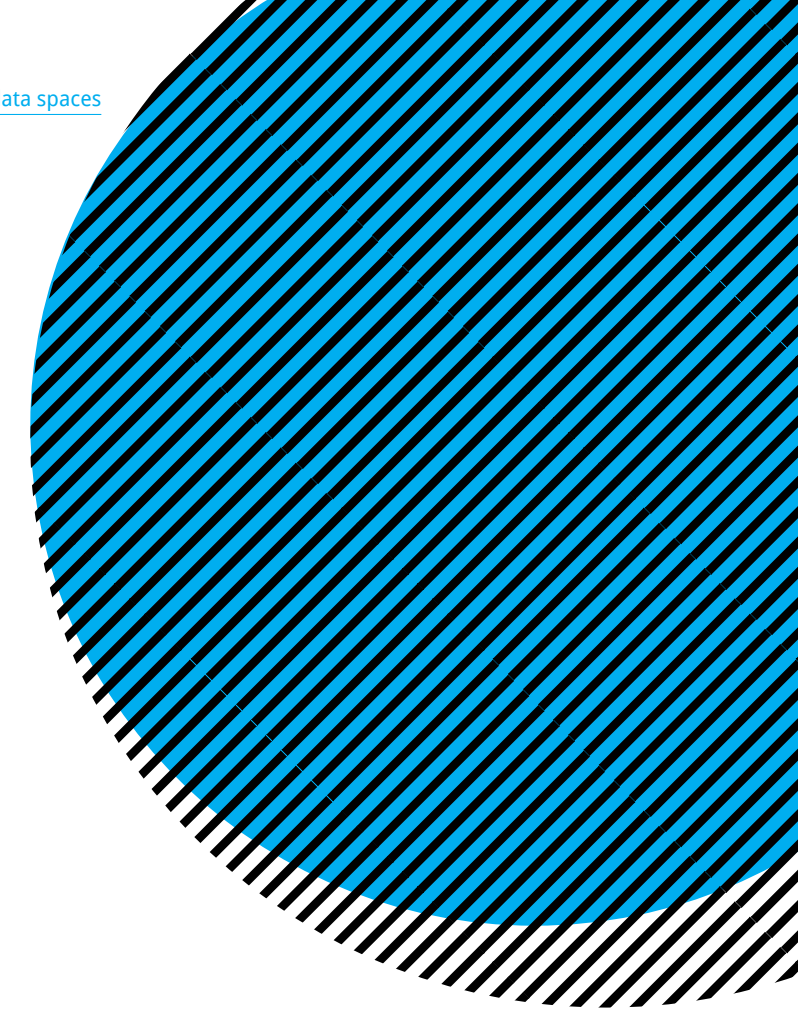
**D**ata spaces are proliferating as businesses seek to share information securely and effectively. But what if we could take it a step further and enable different data spaces to work together? That's where IDS technology comes in.

IDSa is excited to announce that IDS technology now allows data spaces to communicate with one another. This means that data can be shared not only within a single data space but also between multiple data spaces, enabling greater collaboration and addressing issues like climate change.

### Tracking carbon emissions

But how? Let's take a closer look. For instance, companies are increasingly required to track their carbon emissions and report on them. With connected data spaces, companies can securely share this information across borders, helping to reduce carbon emissions and achieve sustainable development goals. Data from partners can be continuously monitored in a sovereign way – meaning the data owner defines how this sensitive information can be used to keep business-critical information from being shared.

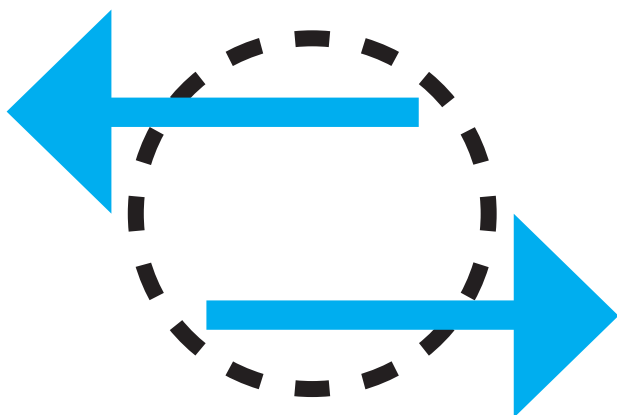
The Fraunhofer-Institute for Software and Systems Engineering (ISST), along with companies from Japan, Germany, and the Netherlands, is leading the way in linking the data ecosystems of OMRON manufacturing factories in two countries. The key to this interoperability is the use of data connectors, such as the Data Space Connector provided by soivity and the TNO Security Gateway, which allow for seamless sharing of data between different connector technologies.



### Demonstrator with visual dashboard

It was challenging to exchange the right and relevant data. Many questions were solved: What kind of data can or should be shared? What is needed? In the end, not only was data shared, but a visualization layer was added to show CO2 emissions in real-time through a dashboard. The IDS-RAM was the basis, and the current result is a demonstrator. The demonstrator benefits from soivity's strong experience with IDSA technology and TNO's experience in applied research.

Taking the next step towards production level, this demonstrator serves as a blueprint applicable to any business or domain in the future, working effectively on a large scale. It's a significant milestone in building the ideal data space landscape and tackling climate change. By establishing trusted data spaces, we move closer to a carbon-free world.



# Green Deal Data Space is launched to support the EU's climate goals

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**W**hen the waters of the river Ahr rose at an unprecedented speed and scale in the summer of 2021 and caused one of the biggest natural disasters in Germany's history, almost everyone was unprepared. Private homes, critical industrial facilities, major pieces of infrastructure, and cultural sites were destroyed, causing disruption and unprecedented costs.

Only a month before the Ahr-valley catastrophe, the German federal gov-

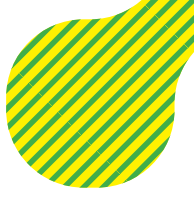
ernment had launched the "PAIRS" project, a collaboration with industry aimed at leveraging data to improve the management of large-scale crises. With the disaster, this project took on a whole new urgency.

Among the many good things emerging from the PAIRS (Privacy-Aware, Intelligent and Resilient Crisis Management) project is the Green Deal Data Space, designed and managed by the Düsseldorf-based data consult-

ing company Advaneo. "We are offering ways to use data that will greatly enhance resilience and sustainability, at a time when the likelihood and frequency of crises have greatly increased due to climate change," says Advaneo CEO Jürgen Bretfeld.

Bretfeld sees the Green Deal Data Space as a tool to anticipate and simulate crises and to use AI to prepare courses of action. To achieve these goals, a non-profit alliance has been





formed to bundle and share data. Ultimately, this data will be aggregated and shared in a data space dedicated to building resilience and sustainability throughout the European economy.

"The partners are coming together in a bottom-up approach," says Bretfeld. The Green Deal Data Space arose

out of a shared desire and a shared need. "We are all looking for resilient and sustainable business models and strategies, and we understand that this can only happen collaboratively."

For Bretfeld, resiliency and sustainability are inextricably coupled. "They really are two sides of the same coin." Making use of data to improve crisis management makes companies and institutions more robust, while becoming more energy efficient and sustainable "puts money into the bank of resilience as well." Resiliency helps manage crises, while sustainability helps prevent them.

To illustrate the point, the Green Deal Data Space has launched two complementary "lighthouse" projects. One is the "supply chain radar," which enables rapid responses to supply chain disruptions through unforeseen events. The other is the "Carbon Footprint Data Sharing Service."

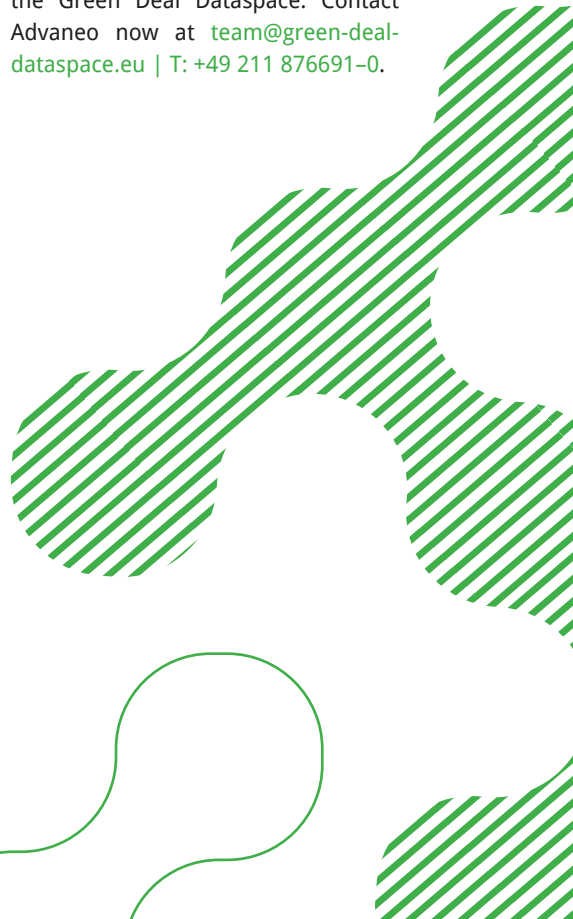
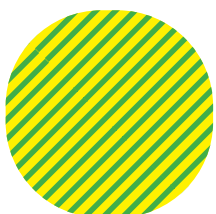
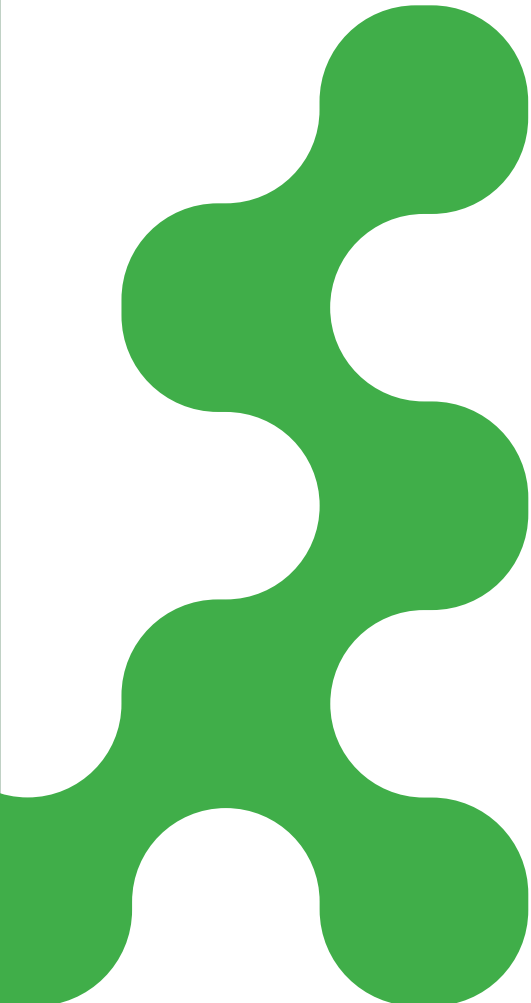
The Carbon Footprint Data Sharing Service is a proposed tool that aims to assist the European Union in meeting its emissions reduction targets and transforming its economy towards a sustainable future. The service will enable participants to accurately identify carbon emissions throughout their supply chains and work together to reduce them in order to comply with legislative standards.

The sharing of data will allow for a more detailed understanding of the carbon emissions associated with a given product or service. For instance, if a company manufactures a product that is sold in several countries, the Carbon Footprint Data Sharing Service will enable the company to track the carbon emissions associated with the entire supply chain, from the production of raw materials to the manufacturing process, transportation, and distribution.

By identifying emissions along the supply chain, participants can work together to find ways to reduce them, such as using renewable energy, improved transportation methods, or more sustainable sourcing of raw materials.

As with all other data spaces, the success of the Green Deal Data Space depends on maximum participation. To that end Advaneo and the partners of the newly founded alliance are working hard to make this space as open and inclusive as possible. Key to that effort is interoperability across domains and various data spaces. "We need to be available not only to stakeholders that use the IDSA standards, but to everyone," says Jürgen Bretfeld. For that reason, Advaneo is doing its best to offer services and even build components for anyone interested in participating in the Green Deal Data Space and becoming a part of the new sustainable European economy.

Discover how you can benefit from the Green Deal Dataspace. Contact Advaneo now at [team@green-deal-dataspace.eu](mailto:team@green-deal-dataspace.eu) | T: +49 211 876691-0.



# Data sharing gets real with Cofinity-X



### Automotive Consortium brings Catena-X technology to market

It's been a mere 18 months since major players in the European automotive industry came together around a revolutionary idea. In an unprecedented collaboration companies including BMW, Mercedes, VW and others decided to develop tools that allow them to share data for their mutual benefit.

Their idea evolved into a major data-sharing project called Catena-X. Now, the results of this project are ready to enter the marketplace. In April 2023, ten so-called "use cases" or – in common language – applications will begin building data chains, allowing partners throughout the automotive value chain to track and share critical data. The use cases will make their debut at Hanover Messe, Europe's leading annual technology trade fair.

"This is a huge step forward," said Sven Löffler, tribe and chapter lead, data-economy, and business owner for portal marketplace search and AM, one of the non-automotive partners in the Catena-X project. The first of these use cases will go online later this year.

The market entry of Catena-X's data-sharing ecosystem is enabled by a newly formed consortium called Cofinity-X, a joint venture between ten German corporations associated with the automotive industry, including chemistry giant BASF, Mercedes, and BMW, as well as medium-sized parts suppliers such as Schaeffler and information specialists such as T-Systems. Cofinity-X was created specifically to form a marketplace for the data-sharing network Catena-X. Catena-X's ecosystem itself is based on the IDS standard and the European cloud infrastructure Gaia-X.

The use cases that will be presented at the Hanover Messe, are all related to the theme of sustainability. "At this point, sustainability is our central focus," said Mr. Löffler. The use cases will facilitate things such as CO2 and environmental and social governance monitoring, traceability, and the circular economy. At the trade show, the audience will be able to experience how the data chains work.

One of the prime application examples is tracking the life cycles of batteries, which is becoming increasingly important as the automobile industry switches to electric propulsion. The new products will enable the collection of data on batteries from their assembly to their dismantling and make it available for companies throughout the supply chain, from car makers to chemical companies to suppliers of raw materials. This, in turn, will enable decision making as to reuse as well as facilitate reporting to regulatory bodies increasingly enforcing environmental standards.

To get an idea of how complex this process is, consider that BMW alone works with 12,000 suppliers from 70 different countries.

"If you think of it as layers of data along the supply chain, we currently get three layers deep. However, the entire chain has at least eight layers," said Mr. Löffler.

The benefits for all participants, however, are immeasurable.

"This is a win-win for everyone," said Mr. Löffler.

Participation in the data chain accomplishes far more than merely facilitating reporting to regulatory bodies. "It reduces costs for everyone. And it allows all participants to respond much quicker to any issues that might arise along the value chain."

Such disruptions to the value chain, especially as they arose during the height of the Covid pandemic, were a major motivation for the automotive industry to collaborate more closely when it came to data sharing.

Original hesitancy by the partners to share critical data was overcome through the implementation of the IDS standard for sovereign data sharing and the use of the Gaia-X infrastructure. Together, they allow all participants in Catena-X to retain full sovereignty over their data.

The market entry of Cofinity-X this April is a new landmark for data spaces altogether. With the move, Catena-X, already a lighthouse project in the framework of the European digital strategy, is forging into new territory.

This comes with a range of critical challenges. "In a sense, what Apple is doing for Apps and Services, we are doing for the data ecosystem," said Mr. Löffler. Like Apple, Catena strives to ensure interoperability. For the success of the network, it is crucial that it can be accessed from a wide range of systems. To that end Catena-X provides specific kits to the software developers of its partners, allowing them to seamlessly connect to the data chain.

Ultimately, the hope is, that the experiences gathered, and tools developed within the automotive data space can be transferred to other data spaces. "We are working hard to make sure that what we are creating for the automobile industry can be made interoperable for other industries," said Mr. Löffler.

Hence, the launch of Cofinity-X is one more step toward a wide network of shared data as the basis for the digital economy of the future.



# A testbed for the agricultural revolution

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**M**odern technology is transforming agriculture, and FlexiGroBots is at the forefront of this change. By harnessing the power of robotics, the European research project is revolutionizing the agricultural landscape with its innovative approach to field cultivation.

Farm labour is hard work, and working in the fields to treat and harvest is especially tedious, physically demanding – and it is expensive. However, thanks to FlexiGroBots, farmers in four EU countries are now able to enjoy the

benefits of robotic assistance, making their operations more efficient and cost-effective. These little helpers not only cultivate the fields with speed and precision, but they also collect valuable data in the process.

### **Robotic assistance for precision agriculture**

The robot data is providing critical insights into the condition of soil and plants, as well as identifying potential pest infestations. With this information at their fingertips, farmers are able to make better decisions, leading

to increased yields and higher quality crops. This marks a significant turning point in the agricultural industry, as it demonstrates the vital role of technology and data-driven insights in shaping the future of farming.

This is where the Spanish company ATOS and IDS technology come into play: The technical setup and secure handling in the agricultural data spaces are coordinated by the company. Curious, we sat down with two of their project-leads to find out how this works. How are the robots doing?

Daniel Calvo Alonso, head of AI and big data at ATOS, and Carlos Cob Parro, data scientist at the enterprise, gave us an overview.

### **Implementation and data sharing**

The goal of FlexiGroBots is to implement new solutions to improve precision agriculture, using technologies such as artificial intelligence, big data, and robotics fleets. We are talking here about ground robots, but also drones, and all these robots collaborate to perform several tasks in the fields. The consortium behind this project, coordinated by ATOS, has 16 partners from all over Europe: research centers, universities, companies providing robotic solutions, companies that are specialized in farm management systems.

There are three different pilot use cases: one in Spain for grape production, another in Serbia and Lithuania for blueberry farming, and finally, one in Finland where grape seed is the crop. The robots assist the farmers with collecting the crops. Automatic testing of the soil is performed to detect pests early and assess the health of the crop and the cultivated area. Soil robots equipped with sensors and artificial vision approach areas where the disease may occur and send images. This allows experts to determine whether treatment is needed, and if so, the robots carry out the plant protection treatments. The use of pesticides is reduced this way, and treating of non-infested plants is largely avoided. These are the tasks for which the IT solutions are built.

### **Data spaces to connect and to share the AI models**

All robots send their data to the corresponding farm management system. The data flow goes from the devices – the robots – to the systems that are managed by the providers of these devices. That is where the connector is, and the sharing of the data starts.

Carlos adds, “The data space is the bridge between the different companies, the different types of agricultural systems.”

The main idea of the project is to use this data space to connect and to share the artificial intelligence models, bringing together various actors to mutually benefit from each other’s data. The platform maximizes synergies, collaboration, and trade with data while at the same time ensuring data sovereignty, governance, and security for data-driven digital ecosystems. And that is very central as Daniel points out, “We want to guarantee that the data collected by all the different robots, devices, and systems participating in the project, all this information is shared in a fair and secure manner in the scope of the project.” Let’s look a little closer at how the data sharing is organized.

### **Kubernetes for data spaces**

The IDS Reference Testbed was designed to operate in a restricted test environment. However, for the FlexiGroBots project, it needed to be transformed into a real deployment. The project team developed a set of manifests to deploy the testbed in a Kubernetes cluster. This enables the recreation of a realistic environment, making it easier to migrate from local to cloud infrastructure – and connect all involved companies. To achieve this change in architecture, it is essential to design each manifest using the official IDS components. “Kubernetes is almost a de facto standard of the industry now,” explains Daniel. “It’s an open-source project that is used everywhere.”

Kubernetes was chosen because of its various benefits. It allows for easy deployment of the data space/testbed in any cloud solution and does not require a large infrastructure. It is easy to scale and connect various connec-

tors in different parts of the world, whether you’re running something in Google Cloud, Amazon Web Services, or Azure. When you use Kubernetes, it works the same on any of these platforms, ensuring high availability. Therefore, regardless of the number of users, the services will work well.

The use of Kubernetes is important because, as Carlos cautions, “data spaces that work in a local environment are a great achievement, but in the real world, you must start migrating these proof-of-concepts to the technologies used by the industry.” Daniel adds, “I think having a minimum viable data space relying on Kubernetes is a great milestone. It’s like the first step before going into production for real use cases and not just a small proof of concept.”

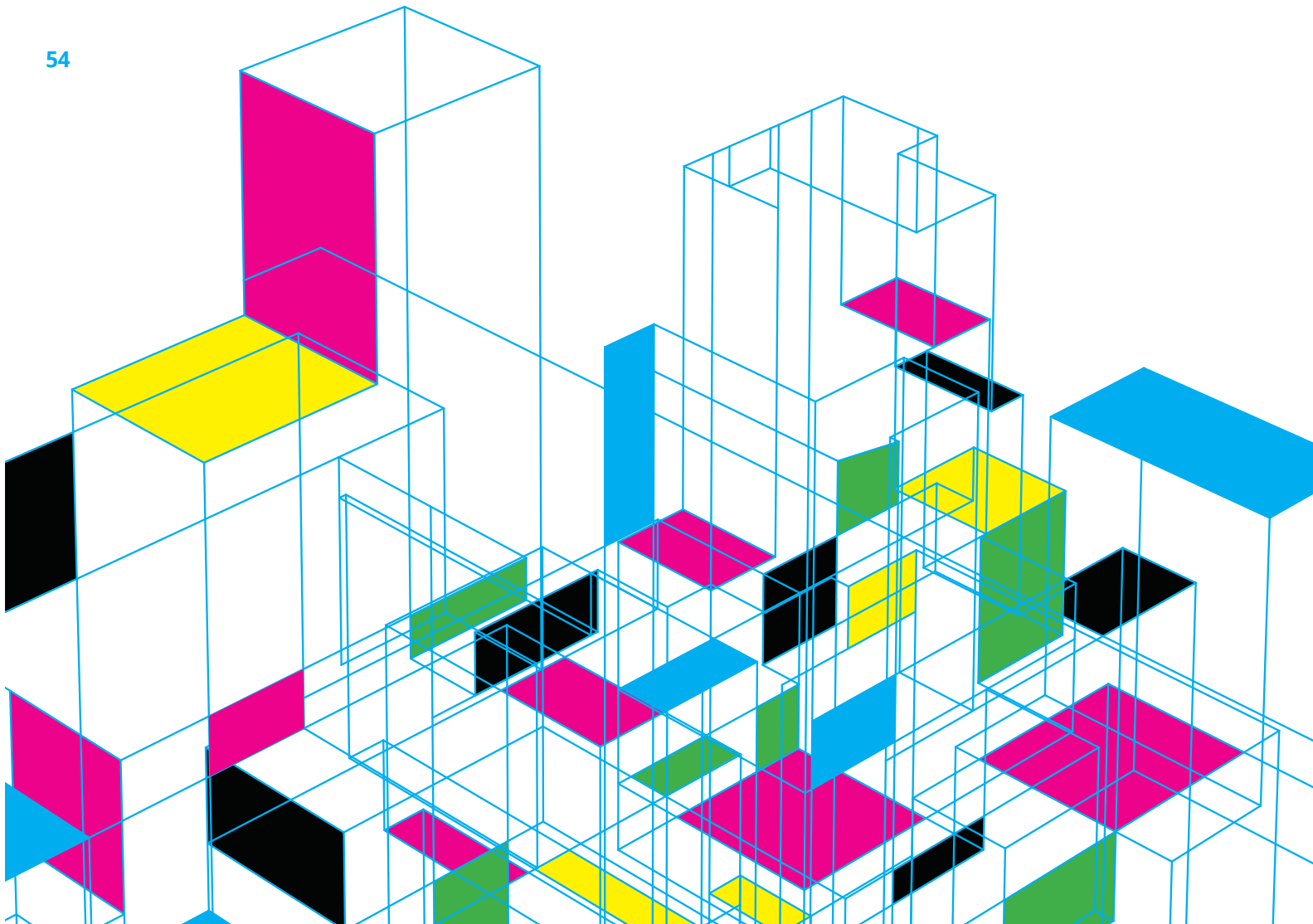
### **Plans for the long run**

And what are the plans for the long run? “At the moment, we are developing this instance, this adaptation of the testbed in the FlexiGroBots project, but we are also involved in other research innovation projects to progress the implementation of the data spaces concept for different verticals. We are involved in projects for the energy sector, as well as for manufacturing and the Green Deal,” Daniel explains. They plan to use the implementation within these projects and to expand the current features for wider use in the future.

IDSA is part of the FlexiGroBots project, and the knowledge gained there can be used for the further development of the IDS reference architecture and the architecture of the data connector. Carlos from ATOS is an active participant in various working groups organized by the IDSA. The ambition is to feed all lessons learned into the future development and refinement of data spaces for all.

# IDS Reference Testbed: empowering development and certification

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### The importance of the IDS Reference Testbed in development and certification

The IDS concepts, architecture, and components have become the standard for sovereign data sharing in Europe and beyond. However, to achieve large-scale adoption, technical components must be tested for interoperability compliance. To address this, the IDS Reference Testbed has been created.

The "IDS Reference Testbed – Key in Development and Certification" position paper sheds light on the diverse range of applications and usage scenarios of the IDS Reference Testbed. Its insights highlight the pivotal role the testbed plays in facilitating development and certification. The position paper is available for download on the IDSA website.

### Component and interoperability testing

The position paper explains how to use the IDS Reference Testbed for developing IDS components and preparing for IDS Certification. The IDS Reference Testbed is an open-source software comprising IDS components that comply with IDS specifications for establishing connections and communication.

These components include the Certification Authority (CA), the Dynamic Attribute Provisioning Service (DAPS), a Metadata Broker, and two Dataspace Connectors. It also includes an automated test suite for testing a data connector on interoperability and compliance to the IDS specifications. To test for certification criteria, a questionnaire tool that guides through those aspects will be available.

### IDS Reference Testbed usage scenarios

The IDS Reference Testbed serves three usage scenarios: supporting the development of IDS components, the development of deployment scenarios, and the preparation for IDS certification.

**Development of IDS components:** The IDS Reference Testbed supports the development of IDS components in terms of their behavior as an individual component and their interoperability testing of a set of IDS components in an IDS data space.

**Deployment scenarios:** The IDS Reference Testbed is a starting point for developing scenarios for using the data space,

including a minimal viable data space. It has basic functionality for dataspace development, data services, business workflows, and ecosystem analysis.

**IDS Certification:** For organizations to confidently share data within data spaces, trust is crucial. Hence, the proper implementation of data space components and their interoperability with other IDS components must be ensured. IDS certification guarantees this, ensuring a seamless data exchange.

The IDS Reference Testbed streamlines certification preparation at the component level, allowing companies to resolve issues before the actual certification process, reducing costs and efforts. Existing open-source IDS components integrated with the testbed can further help companies meet certification requirements, reducing certification efforts for the complete solution.

The development and deployment of the IDS Reference Testbed requires involvement from various stakeholders, each with different roles and business opportunities. The IDSA is responsible for developing and deploying the IDS Reference Architecture Model and managing the testbed to promote and enable certification of IDS components. The core beneficiaries of the testbed are the Evaluation Facilities and the IDS Certification Body with the involvement of Service Providers, national IDS Hubs, and the IDS Support Organization. Close collaboration between these stakeholders is necessary to further develop and adopt the testbed.

### Getting started

The IDS Reference Testbed, available as open-source software, can be accessed from the IDSA repository on GitHub. This repository provides a preconfigured environment that includes all necessary security certificates, as well as an installation script that creates docker containers for all components in the testbed.

# IDS-I position paper examines data sovereignty requirements for the manufacturing industry



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**A**s digital technology becomes more prevalent in manufacturing, also across company boundaries including the whole supply chain, there is a growing need for secure, trustful and seamless data sharing. The IDS-Industrial Community (IDS-I) recently published the position paper “Data Sovereignty – Requirements Analysis of Manufacturing Use Cases”, which explores the data sovereignty needs of the manufacturing industry.

In April 2021, the IDS-I published their first position paper which stated that data sovereignty is a crucial factor for success in the manufacturing industry. Among other things, the paper called for a deeper understanding of data sovereignty, analysis of relevant scenarios and players, and discussions with business and engineering partners.

## **Use case-driven approach to identify data sovereignty needs**

The recently published second position paper contributes to the conversation by examining the requirements for data sovereignty in the manufacturing industry. Specifically, it focuses on access control, usage control, and data provenance tracking. While data sharing in production ecosystems is desirable, the paper emphasizes the need for data providers to maintain control over data usage by consumers, which can

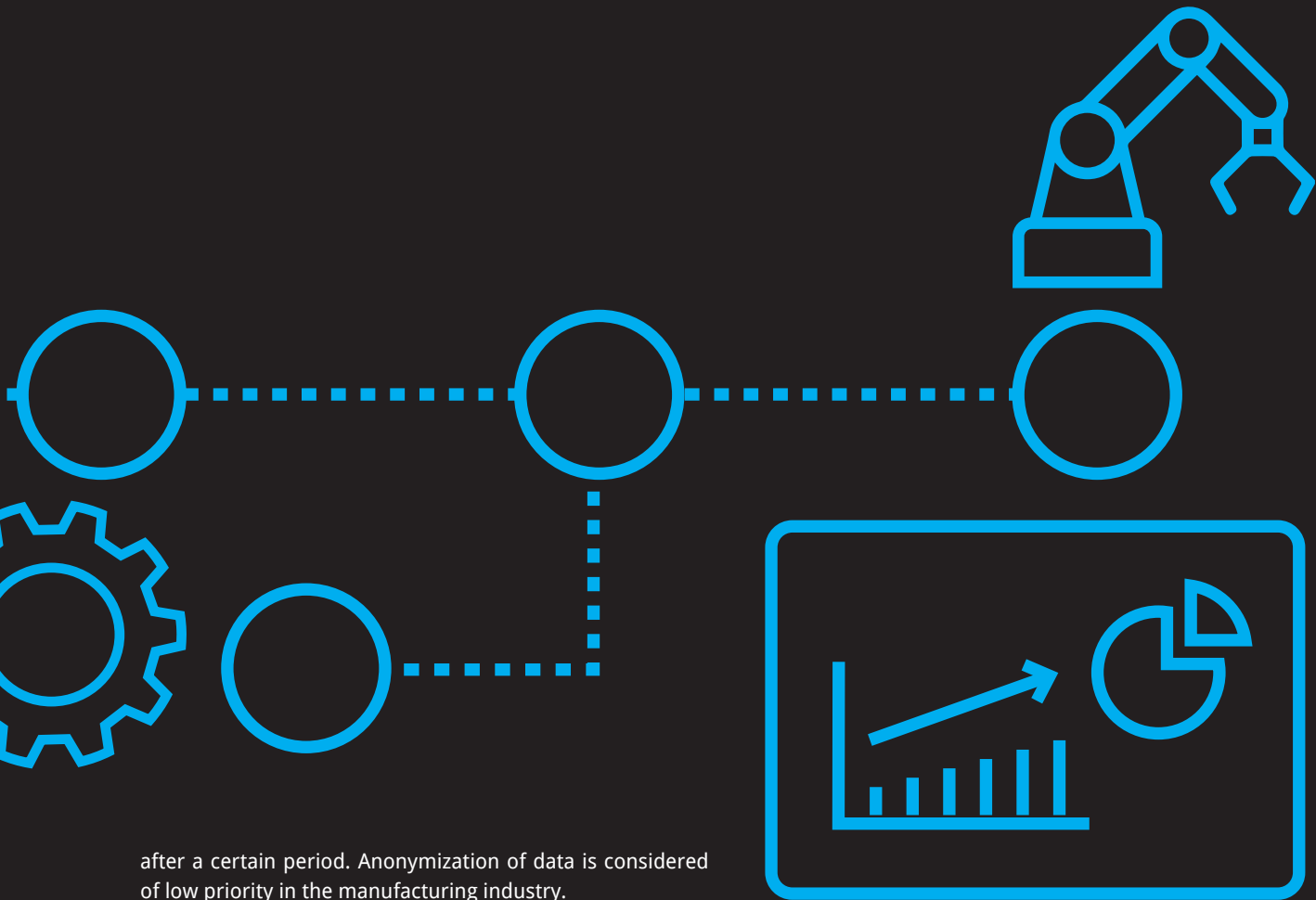
be complex in distributed environments. To prioritize specific data usage control needs, the authors suggest assessing user requirements.

To address this issue, the paper takes a use case-driven approach and identifies a structured and prioritized set of requirements on a conceptual level. The analysis uses three reference use cases for smart production systems, namely Collaborative Condition Monitoring (CCM), Manufacturing as a Service/Smart Factory Web (SFW), and Evaluation of the Impact on UN Sustainability Development Goals (SDG). From these reference use cases several sub-use cases are derived. By collecting requirements from these use cases, the paper aims to contribute to the unification of the concepts and technologies that implement the reference architectural model of the Platform Industrie 4.0 (RAMI 4.0) and the International Data Spaces (IDS-RAM).

## **Classification of data sovereignty requirements**

From the use case analysis, the authors derive the priority of data sovereignty requirements in the manufacturing industry. The analysis shows that preserving data integrity across value chains is the most important requirement, followed by keeping data secrecy and observing usage scope, tracking data provenance, separating duties, and deleting data items





after a certain period. Anonymization of data is considered of low priority in the manufacturing industry.

The purpose of this classification is to help designing and implementing data spaces for the manufacturing industry such as Manufacturing-X and other data spaces based upon the Gaia-X and IDS concepts. To expand on this, it may be beneficial to consider a classification of data associated with assets, such as open, anonymized, public, and private data (e.g., data without personal information) and connect them to the data sovereignty capabilities outlined in this position paper. In addition, it is necessary to assess the potential impact of the upcoming European Data Governance Act (DGA) on the conduct of companies operating in the industrial production sector.

**Join the IDS-I community**

IDS-I is a community of over 60 organizations from around the world that is part of the International Data Spaces Association. Its objective is to analyze how IDS concepts and principles of data sovereignty can be applied to the requirements of the industrial sector.

For more information, please contact the authors or join the IDS-Industrial (IDS-I) Community by expressing your interest in an email to [info@internationaldataspaces.org](mailto:info@internationaldataspaces.org).



# Explore a wide range of data connectors

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**S**overeign data sharing has gained significant momentum, with companies and open-source projects from all over the world working towards developing data connectors based on the IDS reference architecture. The recently released 'IDSA Data Connector Report' provides a comprehensive overview of the available data connectors and compares them based on several criteria, offering a valuable resource for organizations seeking optimal data sharing solutions.

The goal of the report is to make the current use of data connectors transparent. The assessment and evolution of data connectors brings clarity about their application potential, maturity, and certification status, as well as their adoption in industrial business cases and in research scenarios.

## **A diverse data connector landscape**

The fourth edition of the report lists 23 data connectors, including the Eclipse Dataspace Components, the TNO Security Gateway and the TRUE Connector by Engineering. The report is updated monthly and published on the IDSA website, with a changelog highlighting the differences from the previous version.

The report clearly indicates that the connectors cater to diverse industries and use cases. Some are available as free and open source-software, while others are proprietary software with a few already on the path to IDS certification. To begin, let's understand why the data connector is considered a core element of a data space.

Data sovereignty is essential for secure and trusted data sharing in data spaces. It gives data providers control over how their data is collected, processed, and used by consumers, a vital principle in today's digital economy where data is shared across borders and organizations.

## **At the heart of data spaces: the data connector**

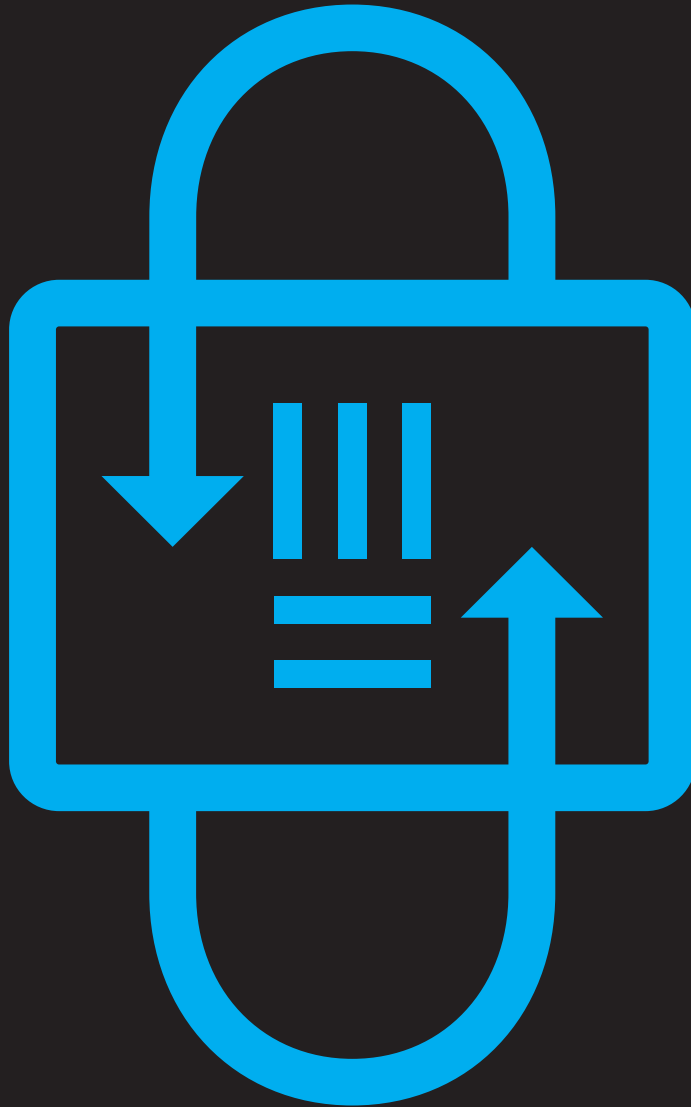
The data connector makes all this happen. It allows seamless data flow between different systems and devices, enabling secure connections, verifying participant identities and authorizations, and ensures data usage control. These features allow for the data provider to establish rules and obligations regarding who can access their data and how it can be shared or utilized.

The IDS Certification, introduced in 2022, allows connector providers to demonstrate compliance with technical, functional, and security requirements outlined by the IDSA working groups. It ensures connector interoperability and offers varying levels assurance for data connectors, with the requirements and criteria defined in the IDS Certification catalogs.

## **Different types of data connectors**

Alongside the overarching need for data connectors and data spaces interoperability, there are also distinct characteristics that differentiate between data connectors. The Data Connector Report groups the different types of data connectors into four categories: data connector frameworks, generic open-source solutions, generic proprietary solutions, and off-the-shelf connectors. Examples are provided for each category.

What are the next steps? The goal for the following months is to gather additional connector implementations and refine the details and content. The Data Connector Report will aid in the ongoing evaluation and advancement of data connectors by offering clarity on their potential, development, certification, and adoption in industrial and research cases.



Do you have a connector that is not listed in our Data Connector Report? Use our dedicated contact form to inform us. We also welcome your general feedback and updates on any listed connector.



# Simple truths

## A global standard for data sharing

In a perfect world of secure and self-determined global data exchange, anyone will be able share data with anyone: Whether you are a tourism entrepreneur in Japan, a software developer in Europe, a shipping company in the US or a research facility in Australia. Currently, all these players generate and store data using vastly different systems. IDSA has created a reference by which all these systems can cooperate with each other seamlessly. The IDSA

ecosystem of companies, research organizations and facilitators has developed a multi-layered international standard for data sharing. Anyone who adopts this standard anywhere, will be able to tap into a universe of data. This will dramatically enhance the capacity of all participants for innovation and expansion – whether they are an individual, a corporation, a non-profit research institution or a government agency.

## A long-term project to enable sovereign data sharing

IDSA started eight years ago, when a core group of believers in the future of data economy made it possible to establish an architecture for the self-determined (sovereign) exchange of data in virtual data spaces. Today this concept has grown into a data sharing infrastructure adopted by corporate and institutional entities around the world. But this is only the beginning. Data spaces are proliferating, often using widely different systems and rules for data sharing. This creates a unique set of challenges. Soft as well as hard infrastructures must be harmonized and a system of governance put in place to create a unified framework for data spaces. In the coming years, IDSA and our partners will take on the challenge of uniting all these moving parts into an ever-evolving ecosystem of free and sovereign data exchange.

## A data strategy for Europe

European companies, institutions and individuals that need to share data want to be independent from big commercial global platforms and cloud providers. They want to be able to collaborate while retaining control over their data and realize the value it generates. They want to be in charge to take their choices. For that reason, the European Commission has released a data strategy that enables data providers to move freely between platforms and platform providers while guaranteeing control over their data. IDSA and Gaia-X – with many others on the bandwagon - have developed the foundation that enables data exchange based on these goals. However, IDSA does not see this ambition being only limited to Europe. We strongly believe that data sharing based on these values should be accessible to anyone, anywhere.

### What is the DSSC?

In October 2022 the Data Spaces Support Center has been launched as a crucial institution for implementing the European data strategy working on behalf of the European Commission. Its mission is to harmonize all parallel and partly scattered data space endeavors and standards towards a European blueprint for data spaces. The DSSC will be lending a hand to everyone and every consortium striving to erect a data space and benefiting from it. The DSSC, a consortium of 12 leading organizations in the field of data spaces, will be a one stop shop for the establishment of data spaces across sectors throughout Europe – safeguarding interoperability and providing data sovereignty. The DSSC will provide tools, building blocks and resources for the successful establishment of data spaces according to the standards developed by IDSA and others related to data spaces.

### The future of data economy

The current structure of the data economy, with few large players in control of the vast majority of data, stifles innovation as well as the expansion of the data economy. Data spaces have the potential to dramatically change the game. They can free up vast amounts of data to a great number of users and greatly enhance innovation as well as the growth of the economy for the common good. At IDSA we have started the journey years ago and co-created the soft infrastructure for free and secure data sharing everywhere and for everyone, democratizing data control and usage. By providing every participant with full control over the use of their data, we make it possible to share complex data securely and create a vast range of new and exciting products and services across borders and sectors. Yet our work has only begun. Only a small percentage of data is currently shared between private and commercial entities. Our task is to accelerate the adoption of our standards to make more data available to more people and thus enhance the future of the data economy. We continue to believe in the potential of the internet to improve the lives of people around the world. To realize this potential, the greatest possible amount of data must be made available to the greatest possible number of participants.

### Data sovereign Europe

The vision of the European data strategy is an independent European digital single market resting on the pillars of digital and data sovereignty. That means a Europe in which information is shared freely across borders and sectors for the greater good of the entire European economy. IDSA and Gaia X have been trailblazing to make that vision a reality. With the architecture of data spaces and a federated cloud/edge infrastructure, the conditions are in place for sovereign and free data sharing that allows all stakeholders to maintain control of their data and realize their full value. In the coming years, we will work hard on the broad adoption of this infrastructure and thus on the realization of the dream of a data sovereign Europe.

### Continuity of data sovereignty

When data providers enter a data space constructed on IDS principles, they can choose their level of data sovereignty according to their needs. A small or medium company with limited data exchange needs, for example, will require a much lower level of security than a large industrial user. For the small business participant, a simple interoperability test and basic cyber security requirements might be sufficient. This will be available at low cost and with a low entry barrier. Higher and more complex levels of data sovereignty are available in combination with a more in-depth evaluation. Each participant can choose at any point, which level of security their use case requires and which level of investment in sovereign data exchange is economical for them.

### IDS and Cyber Security

IDS certification entails an adherence to best practices in secure software engineering. The IDS approach can be characterized as “Security by Design”. Security is a basic principle for engineering software from the start and not an afterthought

### IDS and Artificial Intelligence

The quality of artificial intelligence depends on the quantity and the quality of data used to create it. For that reason, secure and sovereign data exchange is more important in the field of AI creation than in any other area of technology. Only if stakeholders can trust each other with their data, they can develop AI products that benefit everyone. If a car manufacturer, for example, has access only to their own data to develop a self-driving car, it will be much more difficult to produce than if they can share the data of their competitors. In addition, the IDS architecture can help to safeguard AI products from manipulated or compromised data.

### IDS and industrial cloud platforms

The growing number of industrial cloud platforms presents a particular challenge for data sovereignty and data security. When using a cloud service, a data provider is likely to enter an intransparent environment. It has become increasingly difficult for users of industrial cloud platforms to know who might have access to their data along the data chain. Together, IDS and Gaia X help to create transparency for all users and empower data providers to make informed choices. Again, interoperability is key to this endeavor. We strive to provide transparency to data providers whether they use centralized or decentralized platforms for their valuable data to achieve interoperable and portable systems that fit to the needs from customers in industry, governments and beyond.

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